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DEMAND SCHEDULES—"NORMAL" AND "INSTANTANEOUS"

R. L. MIGHELL AND R. H. ALLEN

Bureau of Agricultural Economics

THE purpose of this paper is to point out a serious gap in the economic theory covering demand. Put in a very few words it is this: We have not developed a satisfactory explanation of normal or long-time demand. Nothing that has been done on the subject has given us an adequate approach to the problem of consumers' response to price over more than the short term. We have developed neither the theory nor the methodology for estimating what quantity of any product will presently be taken by consumers if the price has definitely fallen to a level 10 per cent lower relative to other prices and consumers have reason to believe it is there to stay. And similarly if the price has risen.

Demand theory and research procedure have been cast in terms of instantaneous or short-time schedules. These are represented as shifting through time as a result of changes in tastes, numbers, or purchasing power of consumers. This conventional procedure is natural and useful for studying short-time problems and for tracing a chronological succession of short-time relationships. But it is quite illogical to suppose that a record composed of a succession of short-time schedules, even if this should extend over a very long period of time, would throw very much light on what consumers' responses would have been if prices had fluctuated around levels different from those which actually prevailed during the period studied.

The influence of the time factor seems to have been more

fully appreciated on the supply side. The orthodox expositions of normal price carefully distinguish the effects of varying periods of time on the response of production to price. Probably no one would attempt to explain normal supply in terms of shifts in short-time supply schedules.

Extent of the Omission in Theory and Practice

A brief statement such as the foregoing may not be fully understood or appreciated unless we examine in some detail its basis in fact and its practical importance.

Alfred Marshall has probably had more influence than any other single writer upon the thinking of those English and American economists who have developed demand theory and methodology. Of course, we can also go to Augustin Cournot, Léon Walras, and other mathematical economists for equally precise expositions of demand. Walras, for example, is generally credited with being the first to express the demand for any commodity as a function of the prices of all commodities.¹

In his usual thoroughgoing manner, Marshall refers in a number of places to the time required for consumption to respond to price changes.² He cites such illustrations as the slow growth of familiarity with coal as a fuel in England when wood and charcoal became dear, and he points out that "habits which have once grown up around the use of a commodity while its price is low, are not quickly abandoned when its price rises again."^{2a} Despite this, however, we find in a number of places summary statements such as the following that minimize the importance of this fact: "those demands which show high elasticity in the long run, show a high elasticity almost at once; so that, subject to a few exceptions, we may speak of the demand for a commodity as being of high or low elasticity without specifying how far we are looking ahead."³

Among current writers, John M. Cassels, Geoffrey Shepherd, John D. Black, and E. J. Working appear to have recognized the time-consuming character of consumption

¹ See Schultz, Henry, *The theory and measurement of demand*, p. 8, 1938.

² Marshall, Alfred, *Principles of economics*, 8th ed., bk. III, ch. IV, p. 110, 1922.

^{2a} *Ibid.*, p. 807.

³ Marshall, Alfred, *op.cit.*, bk. V, ch. XII, p. 456.

responses to price. Cassels, for example, writing on milk prices, briefly calls attention to the problem, although he minimizes its importance in the case of milk in a final statement that "even with respect to the long-run the demand for fluid milk is not likely to be elastic."⁴

Geoffrey Shepherd devotes two paragraphs to the influence of the time factor on the elasticity of demand in his discussion of the processing taxes on pork under the agricultural adjustment program. He states in part, "Some consumer habits are slow to change. If we have become accustomed to bacon for breakfast, we dislike to change our menu when bacon is scarce and high in price. . . . But if scarcity and high prices . . . give every indication of continuing for several years, we are likely to weaken and change our menu rather permanently."⁵

John D. Black recognizes the significance of this problem in "Research in Farm Management"⁶ in which he states, "In using supply and demand curves in this way, one must make allowance for the usually occurring lag in the response of production and consumption to changing prices." It is of interest to note that Dr. Black was writing about research in interregional competition and that the use of supply and demand curves to which he had reference was in connection with the forecasting of supply and demand relationships that may prevail after changes of considerable magnitude have had time to take place. It was in this same connection that the writers encountered this problem.⁷ This suggests that it is of special significance in this field.

The most nearly adequate statement on the subject that has come to the attention of the writers is one in an article by E. J. Working.⁸ In this article Working carefully distinguishes between "market demand curves," "short-time

⁴ Cassels, John M., *A study of fluid milk prices*, p. 110, 1937.

⁵ Shepherd, Geoffrey, *The Incidence of the AAA processing tax on hogs*, *Jour. of Farm Econ.* 17 (2): 333. 1935.

⁶ Black, J. D., *Interregional competition in agricultural production*, Res. in Farm Management, Social Sci. Res. Council, Bul. 13, New York, p. 95. 1932.

⁷ A discussion of the significance of the long-time demand concept in interregional competition studies is to be found in "Analysis of Interregional Competition in Agriculture," *Bur. Agr. Econ., U.S.D.A., Washington, D.C., 1939.* (Mimeo-graphed.)

⁸ Working, E. J., *Indications of changes in the demand for agricultural products*, *Jour. Farm Econ.*, 14 (2): 239-256. 1932.

normal demand curves," and "long-time normal demand curves," but only devotes one paragraph to the derivation of the latter.

These are the more important references to the time-consuming character of shifts in consumption that have come to our attention. Despite this, however, it appears that their significance has been generally overlooked in practice. The Holy Grail of empirical research in this field has been to find ways and means of deriving "the" demand curve and, having found it, to chart its course through time.⁹ As the late Henry Schultz put it: "In any discussion of an economic policy for agriculture, as well as in many other problems, two questions which constantly and significantly present themselves are: first, what is the shape of the demand curve for each of the more important farm goods, and, second, how do these curves shift their positions through time?"¹⁰ Within the limits of this frame of reference we find a considerable body of empirical research devoted to the problem of measuring the demand function. Two main types of methodology appear to have been evolved. One of these makes use of time series of prices and quantities taken. The other uses data on expenditures for various commodities by groups of families with different incomes. These two procedures are commonly referred to as the time series and family budget methods for deriving demand curves.

The time series studies represent attempts to disentangle by various statistical techniques the effects of those factors that vary over time. This includes shifts in demand, in supply, and in the general price level. If other influences can

⁹ The demand curve of theory is usually thought of as an instantaneous curve indicating what purchasers stand ready to take at specified prices. Discriminating workers have recognized that this is more appropriate for dealers' demand in highly organized markets. For final consumers' demand (and even for dealers' demand in many practical problems) they prefer to speak of a rate of consumption (or purchasing) during some appropriate period such as a month, season, or year. This procedure avoids some of the difficulties in dealing with fluctuations in purchasing due to temporary price changes, which because of short-time storage facilities or the willingness temporarily to forego or step up consumption may introduce considerable day to day elasticity in demand. This departure from the instantaneous assumption, however, still leaves the demand curve essentially short-time in character as opposed to one reflecting consumption adjustments which may take several years.

¹⁰ Schultz, Henry, *The shifting demand for selected agricultural commodities, 1875-1929*. Jour. Farm Econ. 14 (2): 201. 1932.

be successfully eliminated, the shifts in the supply schedule furnish the basis for separate observations of different points on a short-time demand schedule. The final derived schedule represents a sort of average for the period, or it may be accompanied by a supplementary statement concerning changes during the period. H. L. Moore, Henry Schultz, Mordecai Ezekiel, Holbrook Working, E. J. Working, and W. Leontief have contributed to the methodology for doing this.¹¹

The family budget studies have usually dealt with single cross sections in time involving purchases by families at different income levels. When data from such studies are used as the basis for deriving demand curves some rather dubious assumptions about the relationship between price and income changes are frequently made. These will be discussed later. It is important to note here that the family budget approach has usually been regarded as an alternative way of deriving the same type of demand curve that is sought in analyzing time series data. This is perhaps to be expected in view of the general failure to recognize the difference between long-time and short-time demand responses or at least to appreciate the importance of this difference. There are occasional statements in the literature dealing with family budget analyses that suggest that the thinking was in terms of long-time demand schedules. For example, Marschak says: "Es kann also mit dieser Methode nur der langfristige, endgültige Zusammenhang zwischen Mengen und Preisen ermittelt werden—eine Schwäche dieser Methode und eine Stärke zugleich."¹² (Thus, with this method only the final long-time relation between amounts and prices can be derived—a weakness of this method and at the same time its strength.)

¹¹ Moore, H. L., *Economic cycles: Their law and cause*, 1914.

Schultz, Henry, *The theory and measurement of demand*, 1938.

Ezekiel, Mordecai, *Statistical analyses and the "laws" of price*, *Quar. Jour. Econ.*, pp. 199-227. 1928.

Working, Holbrook, *The statistical determination of demand curves*, *Quart. Jour. Econ.*, pp. 503-539. 1925.

Working, E. J., *What do statistical demand curves show?*, *Quart. Jour. Econ.*, pp. 212-227. 1927.

Leontief, W., *Ein Versuch zur statistischen Analyse von Angebot und Nachfrage*, *Weltwirtschaftliches Arch.* 30, Heft 1, July 1929.

¹² Marschak, Jakob, *Elastizität der Nachfrage*, *Beiträge zur Ökonomischen Theorie*, (2) (Tübingen 1931), p. 43. See also footnote p. 55.

However, despite such references to the time factor no great importance seems to have been attached to it by Marschak or other workers. A. C. Pigou, Ragnar Frisch, René Roy, R. G. D. Allen, and A. L. Bowley are among the other more important contributors in this line of endeavor.¹³

Attention should perhaps be called to the fact that the family budget method has been used in attempts to derive demand schedules for groups of related commodities such as food, clothing and housing, or dairy products, meat and vegetables. Such analyses may be brought into relationship with Engel's law relating to expenditures by income groups and Pareto's law of income distribution. The time factor is still significant in this type of investigation but probably less so than when dealing with single commodities.

The Nature of Consumer Adjustments to Price Changes

It is now necessary to turn to an examination of the nature of consumer demand and how consumers react to changes in prices over varying periods of time. On the supply side it is quite generally recognized that certain adjustments to price changes can be made rather quickly, while others involving additions to or reductions in the durable capital structure require more time. Hence the full effect of a given price change does not appear immediately, or, in other words, adjustment to a given price is not completed unless the price remains in effect for some time.¹⁴ On the demand side the problem is not one of rearranging the productive factors but of readjusting consuming habits.

One of the things which consumers strive for is variety. Instead of eating beef every day they like to alternate beef with pork, lamb, chicken, and perhaps fish; likewise with beans, carrots, peas, corn, and other vegetables. The same thing holds true with many types of wearing apparel. The

¹³ Pigou, A. C., A method of determining the numerical value of elasticities of demand, *The Econ. Jour.*, 20: 636-640. 1910. Reprinted in *The Economics of Welfare*, 1920, App. II.

Frisch Ragnar, New methods of measuring marginal utility, *Beiträge zur Ökonomischen Theorie*, No. 3 (Tübingen 1932).

Roy, René, La demande dans ses rapports avec la répartition des revenus, *Metron*, 8 (3): 101-153. 1930.

Allen, R. G. D., and Bowley, A. L., *Family expenditure*, London, 1935.

¹⁴ See for example: Thomsen, F. L., *Agricultural prices*, New York, 1936, pp. 49-53.

various products in each such group have similar properties and hence satisfy similar needs. They are frequently spoken of as substitutes for one another. If their relative prices change, the proportions in which they will be used will change also. Such changes are reflected in the orthodox instantaneous demand curve. We should not, however, limit short-time responses to this type of substitution. Items which are quite unlike may also be substituted for one another in the family budget; for example, more movies may be seen and fewer books purchased. Even the dinner table may suffer at the expense of the new "popular" prices at the neighborhood theater.

Turning to a slightly different type of response we may take milk as an example. A price decline may stimulate some increase in consumption immediately, but a further increase in consumption will involve the use of milk in new ways such as in cooked dishes not previously eaten, in new types of beverages, or even as a beverage by members of the household who had not previously so used it. The greater part of such changes in consuming habits may come about only gradually over a considerable period.

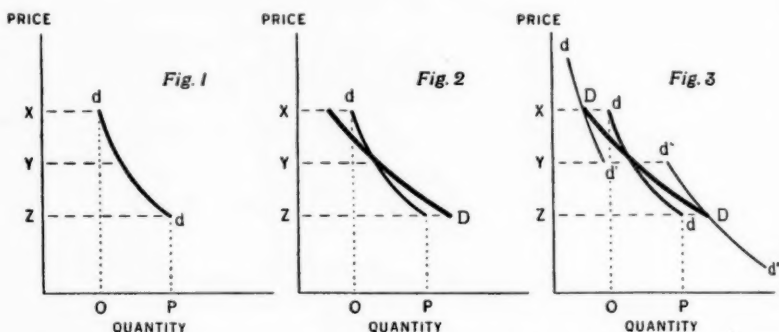
A type of adjustment requiring even more time is that which occurs when a price decline introduces the likelihood of the use of a product in income brackets where it was virtually unknown before. "Take the case of the electric refrigerator. In 1927, when the average model cost about \$350, only 375,000 people bought refrigerators. But, when ten years later, improvements in design and manufacturing had brought the price down to \$170, six times as many people bought them."¹⁵ Such an increase in use of refrigerators could hardly have come about immediately. Considerable time was required for housewives to become familiar with the advantages of the electric refrigerator after the price became low enough to make them prospective purchasers. The long-time adjustment to the present price may still be incomplete.

Or in the agricultural field consider avocados as an example. Ten years ago they were in most parts of this country a luxury enjoyed only by the wealthier people. As production increased it became desirable to reach out into a wider

¹⁵ From a current advertisement, April 1939.

market area. By means of a combination of lower prices and considerable advertising this product became somewhat generally known among members of the upper middle-income class.

At this juncture the objection may be raised that this type of change in consumption is generally recognized as a shift in demand. In a sense it is a shift, but it is brought about in part at least by the price change or perhaps more correctly stated by the existence of the new price situation for a sufficient time. Or, to employ more technical language, the



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utility function or indifference system of the individual is partly dependent upon previously existing price relationships and may be altered in the course of time as a result of changing price relationships. The point to be emphasized here is that by treating all such changes in consuming habits as shifts in demand we fail to recognize or draw false conclusions concerning the effects of price changes as such.

Graphic Illustrations

The point at issue may be illustrated by demand curves drawn in the conventional style with which we assume the reader to be thoroughly conversant. Figure 1 shows a typical short-time curve of economic theory. It signifies that if prices were to vary between X and Z, consumers would take quantities varying between O and P, according to the exact

relationship described by the curve *dd*. In theory this is usually interpreted to mean that consumers would take the quantities indicated immediately after the prices came into effect. In practical applications this restriction is relaxed somewhat; for example, consumption during a period of a year may be related to the average price prevailing during that year.

We are interested in periods which in the case of many commodities may be several years. Now if the price were to go to *Z* and remain for such a period or, more realistically perhaps, if it were to fluctuate about a central point *Z*, the quantity consumed might be expected to increase gradually beyond *P* as consumers became familiar with and made the necessary adjustments to this new price level. Likewise, if the price settled at or varied in the vicinity of *X*, similar effects would be observed, only in this case consumption would fall below *O*. The points reached in this way would fall on a long-time demand curve of greater elasticity which is represented in figure 2 by *DD*. In practice it would not usually be possible to move from point to point on *DD* as is done on *dd* even if considerably more time were allowed. Changes in consumers' habits are not necessarily reversible, and consequently long-time demand curves may best be thought of as irreversible curves applying to a particular time, each point representing a resultant of a different price level during the appropriate preceding period.

We might even construct a third diagram as in figure 3 showing two additional short-time demand curves representing short-time responses to price changes about each of the three different levels. It should be pointed out that these three short-time curves are not intended to represent successive stages in time in the process of a shift in demand. The differences between them represent only changes in consumption resulting from the existence of different price levels for a long enough period for time-consuming adjustments to be made.

Significance of Normal or Long-time Demand

The practical importance of such concepts as elasticity of demand has long been widely recognized. As a recent text

on agricultural prices states: "The elasticity of demand for individual farm products and for farm products as a whole is very significant in connection with various economic problems of agriculture. For example, if the production of a commodity having an inelastic demand is decreased, the total gross income to producers would be increased; while if the demand is elastic, reducing production would reduce the total gross income from the commodity, although prices would be higher. Similarly, the elasticity of demand is important with respect to the effects of tariffs, export subsidies, and practically every other actual or proposed economic measure affecting agriculture."¹⁶

The failure to distinguish between the elasticity of short-time and long-time demand, however, may easily lead to erroneous conclusions. Thus we find Geoffrey Shepherd stating that most of the demand curves for agricultural products which have been empirically derived "are much less elastic at the lower end than at the upper,"¹⁷ and concluding from reasoning based on these conventionally derived demand curves that price discrimination would not pay. It is quite true that many of the empirical demand curves of statistical research appear to be of this character. But the conclusion does not follow unless the curves are of the type appropriate to the time period involved in the practice of discriminatory marketing. If the price discrimination is to be applied temporarily, as for one season—perhaps.¹⁸ If, on the other hand, the discrimination is to be permanent, as in the case of medical fees or public utility rates, for example, it does not in the least follow. The elasticity appropriate to most permanent price discrimination is not the type of elasticity shown by a short-time curve.

In studies of interregional competition it is particularly important to consider the more time-consuming adjustments of consumption to price changes and to reason in terms of the best possible estimates of long-time demand schedules. The

¹⁶ Thomsen, F. L., *op. cit.*, pp. 31-32.

¹⁷ Shepherd, Geoffrey, Price discrimination for agricultural products, *Jour. Farm Econ.*, 20 (4): 792-806. 1938.

¹⁸ Further objections to Shepherd's argument have been raised in recent discussions, but the writers do not propose to concern themselves with their merits in this paper.

effect of thinking of interregional competition problems in terms of demand and supply schedules describing essentially short-time relationships is seriously to underestimate the responsiveness of both consumption and production to price changes.

Short-time demand curves are extremely useful for problems arising within a single year or so, but if continuing programs affecting the production and sale of farm products are to be planned and carried out successfully we must reason in terms of an elasticity of demand based on a longer-time demand curve. Short-time outlook statements confined chiefly to problems of marketing of this year's and next year's crops and livestock are necessarily concerned chiefly with short-time demand. But any long-time outlook must be couched in long-time terms if it is to be useful. We cannot adequately evaluate the possibilities for farmers to produce larger quantities of such products as fruits, vegetables, and dairy products to be sold at lower than present prices and still make reasonable incomes, on the basis of supply and demand curves of the type now generally used in economic analyses.

This reasoning applies with equal force throughout other fields of national policy. If we are to develop economic systems of pricing for railroads and other public utilities, prices must be based on long-term elasticities of demand. The demand for medical and health services must be measured in a like fashion and so on throughout a broad range of public economic problems.

It is also evident that the concept of normal demand has an important bearing on industrial price policy in general, even from the strictly private point of view. It is doubtful whether students of imperfect and monopolistic competition have fully recognized the significance of the time factor in business men's decisions.

Derivation of Normal or Long-time Demand Schedules

It may be objected that there are no factual data from which long-time demand curves may be derived. This is perhaps true if we wish to cover a fairly wide price range, as is likely to be desirable. But this does not justify ignoring the existence of the time factor. By disregarding the time ele-

ment and using the demand schedules derived statistically in forecasting we are likely to be in error with respect to parts of the schedule and possibly all of it. Furthermore, there are a number of methods which are at least worthy of reexamination from the standpoint of their use in deriving normal demand schedules.

The family budget method, by means of which the quantities of a commodity consumed by families at different income levels are used to estimate the quantities that would be consumed with different prices, has already been mentioned. It has usually been assumed as a part of this method that the consumption of a family would be affected in somewhat the same way by a given increase in its income as by an equivalent saving brought about by a decrease in the price of the commodity in question, and that the consumption of a commodity by a group of families after a given increase in their income may be predicted from the consumption of a group of families already at the higher income level. The first assumption is not really satisfactory since the change in price of a single commodity affects its relationship to other commodities while an income change does not. Despite this difficulty it is possible that an estimate of the effects of the change in price relationships may be made with results which are better than those which we now have. If such an adjustment is not made the effect is to underestimate elasticity. In other words, a judgment or subjective step might be included in the methodology to overcome a difficulty over which those seeking an objective and logically valid solution have been struggling for a number of years.

The result of a family budget analysis would tend to be a short-time schedule if incomes of the groups of people dealt with had been fluctuating as freely as the prices which appear in the usual time series. This is not likely to be the case, however, and if incomes have been sufficiently stable for judgments and habits to have taken definite form within each income group the procedure may be expected to yield something quite different. It is probable that within the limitations of the assumptions involved in the procedure the results come closer to approximating a long-time or normal demand schedule. The family budget procedure, therefore,

seems to offer one hopeful avenue of approach to the problem of deriving long-time demand schedules. If family budget data were collected over a series of years, it might be possible to derive a series of normal demand curves showing the trend of normal demand.

Another approach might be to construct synthetic normal demand curves by building up consumer budgets by estimating methods, as has been done in the case of farmers' production budgets. This is closely allied to the procedure which home economists have been using for a number of years in classroom and extension teaching for assisting consumers in working out more rational allocations of their expenditures. The so-called method of "personal estimate"¹⁹ is a variant of this approach in which consumers are asked to estimate what quantities they actually would purchase at each of several different prices for a given commodity. Because of the subjective elements in the synthetic budgeting approach, it is not very hopeful so far as final consumers' demand is concerned. It may have more promise in the case of intermediate products where estimating becomes very much akin to the farm budgeting problem with the same possibilities and difficulties.

A method for obtaining a rough measure of the elasticity of demand in the case of commodities with administered prices and with only infrequent price changes has been used by the French economist, René Roy.²⁰ Briefly, this consists of fitting trend lines to historical data of quantities before and after a price change and considering the difference in level of the two trends as giving two points on a demand schedule. Applying this analysis to data for sales of postage stamps in France and gas for lighting purposes in Paris, Roy obtains coefficients of elasticity based on two points which probably lie approximately on a normal demand curve. Roy allows for a period of adjustment after each price change but apparently does not recognize the full significance of his findings from the point of view of the time factor.

¹⁹ Gilboy, Elizabeth Waterman, Demand curves by personal estimate, *The Quart. Jour. Econ.*, 46 (2): 376, 1932.

²⁰ Roy, René, *Études Économétriques, Les Lois de la Demande*, pp. 82-105. Recueil Sirey, Paris, 1935. This has been called to our attention by Frederick V. Waugh.

A possible method for deriving normal demand from geographical comparisons has also been suggested to the writers by Frederick V. Waugh. If several areas can be discovered in which consumers with similar characteristics and incomes have been purchasing the same commodity at different price levels for a period of time, it may be possible to construct an approximation of a normal demand schedule. A study of milk marketing in Massachusetts by David Rozman²¹ contains some empirical, although sketchy, evidence along this line for fluid milk in two similar Massachusetts cities in which different price policies were pursued during the depression years. The difficulties involved in the geographical approach are somewhat similar to those in the case of historical time series.

The geographical approach has significant possibilities in connection with the experimental method. If some public agency were in a position to establish several different price levels in a number of similar cities for a particular commodity and hold the prices for a sufficient period, a very good approximation of a normal demand schedule might be obtained.

Finally, it should be said that the possibilities of obtaining an approximation of normal demand from time series are probably far from being exhausted, since no direct attack has been made from this point of view. It is quite possible that in a few instances statistically derived demand curves may more nearly approximate the normal demand curve than the short-time curve. This will only be possible, however, if prices have actually covered the full price range on which interest is centered and have remained long enough in each general portion of the range for an adjustment to have occurred in consumption.

Summary

It has been pointed out that there is a gap in economic theory related to demand—that the demand function is not adequately covered by the conventional analysis in terms of short-time or instantaneous demand curves and their

²¹ Rozman, David, Secondary milk markets in Massachusetts in the period of falling prices, 1930-1932, Mass. Agr. Exp. Sta. Bul. 304. 1933.

shifts in position over time. A "normal" or long-time demand curve analogous to the more generally recognized long-time irreversible supply curve of orthodox theory may be helpful in filling this gap.

The importance of this distinction between types of demand schedules lies in the fact that the use of a short-time curve in estimating consumers' response to price changes underestimates the extent of the response when the new prices are to be in effect for a period of several years. This is important in the determination of price policies, tariff policies, and in fact with respect to nearly any economic measure affecting the volume of production.

Possibilities of constructing such normal curves may lie in several directions. Family budget data for different income groups may offer one approach. A closely related type of analysis growing out of the same basic data is that of the synthetic budget method similar to that used in farm management budget studies on the supply side. The method of personal estimate is another variant. Geographical comparisons of similar groups of consumers as well as historical comparisons may have some possibilities. If experimental studies could be set up, the geographical approach might be very useful. In cases of products with administered prices and infrequent price changes, comparisons of the levels of consumption before and after the price changes may offer a convenient procedure, provided sufficient time has elapsed.

Finally, even though first attempts to construct such schedules should prove unsuccessful, there is real point in recognizing that instantaneous demand curves are less elastic than those theoretical normal demand curves appropriate to a period of time of some length.

THEORY OF THE FIRM AND FARM MANAGEMENT RESEARCH¹

T. W. SCHULTZ

Iowa State College

FARM management research which claims more personnel and resources than any other branch of agricultural economics, seems to have reached an impasse. Wilcox² and others³ have directed attention to phases of this situation. The criticisms that are levied against farm management studies are usually: (1) the research results presumably do not provide a basis for guiding entrepreneurial decisions when economic change confronts the farmer, and (2) they afford no way of relating the actions taken within the farm to that of the economy as a whole. These are serious shortcomings and they are not easily exaggerated. The first of these deficiencies covers those decisions which are probably among the most important to a profitable operation of a farm. The second criticism is one that is frequently made, especially in recent years. It has its roots in the fact that those persons (often drawn out of the farm management field) who are responsible for formulating economic policy pertaining to agriculture have not found the data growing out of farm management studies of much value in getting at regional and national problems of agriculture. It has not been possible to go from farm management data about specific farms as reported in typical pamphlets and studies, to issues of policy.⁴

¹ This paper has benefited from the pointed criticism of several of my colleagues, W. W. Wilcox, J. A. Hopkins, L. G. Allbaugh, C. M. Elkinton, G. Tintner and A. G. Hart, each has contributed in certain aspects to the paper. None of course is responsible for the notions as I have seen fit to present them.

Journal Paper No. J658 of the Iowa Agricultural Experiment Station, Ames, Iowa. Project No. 383.

² In this JOURNAL, Wilcox, W. W. Types of farming research and farm management. 20: 417-429. 1938.

³ See Johnson, Sherman, this JOURNAL, Adapting farm management research to new opportunities. 21: 98-106. 1939.

⁴ It may be argued that there is no good reason why farm management research should contribute to issues of "Political Economy," the overall economic problems of agriculture, since farm management is by its nature a microscopic analysis designed to understand what happens within the farm. Much may be said about the probable comparative usefulness of approaching the problems of "policy" (a) by the microscopic route in which the farm is taken as the basic and the smallest action agency in agricultural production and (b) by macroscopic procedures, for instance, an examination of the (mass) production behavior of whole agricultural regions or of all

I. Background

To begin with, I propose to examine briefly certain of the analytical roots of present farm management studies. This background is helpful in obtaining perspective on what is now being done in our Land Grant Colleges and in the BAE in its farm management work.

We have had, broadly, two types of farm management studies, those which have been directed toward a better understanding of the technological problem and those dealing with certain economic aspects. These two types often have been mixed with no clear understanding of the relationship which one of necessity bears to the other. In others the physical and economic have been combined with reciprocal benefits to each. The second type received its economic orientation from Taylor⁵ (1905), Carver⁶ (1911) and other early writers who saw the importance of the principle of diminishing returns as a tool.⁷ For their basic postulates they drew upon West, Malthus and Ricardo.⁸

The progress that was made following Taylor (1905) was not in that new principles were established, but rather in

the farms producing a particular commodity. Most of the "data" entering into policy analysis have been of the latter sort. There are a number of reasons, however, for believing that a more rigorous analytical procedure is possible by studying the problems of policy through the production operations of the individual farm. This does not preclude the macroscopic techniques but it does create a presumption for trying to get at policy issues through farm management studies designed for that purpose.

⁵ Taylor, H. C., *Agricultural economics*, 1905.

⁶ Carver, Thomas Nixon, *Principles of rural economics*, 1911.

⁷ H. C. Taylor's review of Carver's book in the *American Economic Review*, Sept. 1912, pp. 620-624 provides an excellent summary of the use of these tools. Taylor anticipates the shortcomings of the static presuppositions as applied in the analytical scheme presented by Carver.

⁸ It is to the distinct credit of these pioneers in agricultural economics that they saw the distinction between the problem of combining resources in a static situation and that involved in the classical notion which Marshall had in mind when he wrote, "... whatever may be the future developments of the arts of agriculture, a continued increase in the application of capital and labour to land must ultimately result in a diminution of the extra produce which can be obtained by a given extra amount of capital and labour." Marshall, *Principles*, Book IV, Chap. III, Sec. 1. In this Marshall insisted on retaining diminishing returns as a secular prophecy and as such he felt it had little in common with the technical problem of transforming resources into products as of a given time. At another point Marshall observes that "when the older economists spoke of the Law of Diminishing Return they were looking at the problems of agriculture... of the nation as a whole". They "... rightly insisted that, from a social point of view, land is not on exactly the same footing as those other implements of production..." Book IV, Chap. III, Sec. 8; See also my article in this *JOURNAL*, 14: 640-649, 1932. Diminishing returns in view of progress in agricultural production.

perceiving more accurately the way in which they apply. Subsequent extensions paved the way for better empirical studies and as a consequence it became possible to put to test and verify certain basic production hypotheses.⁹

Spillman, Holmes, Tolley and Peterson and particularly J. D. Black in his book on Production Economics have contributed to this advance. Like the benzine ring to the chemist and Mendel's scheme of hereditary transmission to the geneticist, the input-output technique has become elementary apparatus to the economist working in production. It is somewhat a matter of taste what terminology is followed. Covering the physical phase one is privileged to choose from among Diminishing Returns,¹⁰ Diminishing Physical Output,¹¹ Variable Proportions,¹² and others.

On the economic side, farm management has sought to determine the least cost and highest profit combinations. A good deal of intricate technique has been evolved again, chiefly by J. D. Black, to handle the elements of this phase. It, however, has not been as useful in research as was expected when the particular techniques were first made available. The quest for input-output constants for example, has been far from fruitful. As I shall show later the approach is inherently unrealistic.

The main limitations of these techniques can be traced back to gaps in the theoretical apparatus of formal economics. It is only in contemporary literature that the properties and behavior of the business unit or firm have come to claim the attention of the theorists. The contribution that has resulted from their work consequently was not at hand. As recently as 1933 Professor Knight wrote, "The relation between efficiency and size of firm is one of the most serious problems of theory, being, in contrast with the relation for a plant, largely a matter of personality and historical accident rather than of intelligible general principles."¹³

⁹ A good example of this type of study is that by H. R. Tolley, J. D. Black and B. M. Ezekiel, Input as related to output in farm organization. U.S.D.A. Bul. 1277.

¹⁰ See Knight, Frank H., Risk, uncertainty and profits, pp. 98-104.

¹¹ Black, John D., Production economics, pp. 275-305.

¹² Cassels, John M., On the law of variable proportions in explorations in economics, pp. 223-236.

¹³ From the preface to the re-issue of Professor Knight's, Risk, uncertainty and profit, p. xxi. 1933.

In taking up the economics of the firm it is convenient to keep in mind both the technical and economic conditions that have become associated with the analysis of production in (a) a single resource transformed into a single product (b) multiple resources transformed into multiple products with technical complementarity and substitution present, (c) the enterprise and the plant (d) the firm and (e) the industry. In this paper I will consider only the analytical tools appropriate to understand the actions of the firm.

II. Firm a Planning and Administrative Unit Necessitated by Dynamic Conditions

My next task therefore will be to take up the theory of the firm.¹⁴ In this I shall follow primarily Kaldor,¹⁵ Hicks¹⁶ and Hart.¹⁷

Let us see what it is that the firm does do in our economic system. Specifically what property does the firm possess that brings it into existence and what function does it perform that makes the firm necessary to production? Why isn't production in agriculture, as well as elsewhere, carried on without firms? As Kaldor has shown, the answer is to be found in the fact that the firm has its origin in dynamic¹⁸ conditions.

In an economy where change is taking place production must be adjusted and coordinated in response to the chang-

¹⁴ The concept of the firm is the business unit. In farm management it means the farm. The term farm therefore may be substituted whenever I use the word firm in the remainder of the paper.

¹⁵ Kaldor, N., *The equilibrium of the firm*, *The Econ. Jour.*, 44: 60-67. 1934. Kaldor demonstrates that the firm would disappear under static equilibrium conditions. With the disappearance of the firm competition in production would also of necessity be gone, hence the assumptions of perfect competition in production and static equilibrium are incompatible assumptions. Yet in spite of this incompatibility our studies of what the firm is doing in reality has been approached by an analytical technique based on both of these two fundamental conditions.

¹⁶ Hicks, J. R., *Value and capital* (especially Chaps. VI and VII), (1939). Also I should mention Robinson, Joan, Euler's theorem and the problem of distribution, *Econ. Jour.*, 44 (1934), and her book, *The economics and imperfect competition*; Robinson, E. A. G., *The structure of competitive society* (1932), and Robinson, Austin, *The problem of management and the size of firms*, *Econ. Jour.*, 44 (1934); Coase, R. H., *The nature of the firm*, *Economica*, 4, n.s. (1937); Meade, J. E., *Economic analysis and policy*, pp. 128-129, 154-164, 177-178 (1936).

¹⁷ Hart, Albert Gailord, *Anticipation, business planning and the cycle*, *Quart. Jour. Econ.* 51 (1937).

¹⁸ By "dynamic" we simply mean that changes which takes place over time are introduced and the dating of the events becomes necessary.

ing conditions. It is the function of the firm to do this task. If the pending change involves in addition an element of uncertainty, which is usually the case, the firm also assumes the additional function of uncertainty bearing.

In the real world the production processes of the firm are being altered continuously. Routine procedure will not suffice. Change born out of dynamic circumstances, is ever present. Adjustments are called for. It is the entrepreneur who decides what must be done. The decisions of the entrepreneur are carried out within the framework of the firm. Two interrelated decisions must be made, (a) the amount of adjustment that is necessary, (b) the method for making the adjustment;¹⁹ that is, what to do and how to do it.

It is these adjustments of the firm that give us the key to what we need to look for in our farm management research. To understand the basic nature of these adjustments is to know what is fundamental to the entrepreneurial problem in farming. Since the existence of the firm of necessity arises out of and is dependent upon dynamic conditions, it would appear that both the size of the firm and the success of the firm must be determined within a framework that allows for "time" and "change."²⁰ The following generalizations are implicit in this approach to the individual firm:

1. The firm becomes both a planning and an administrative unit. In it, plans are made and carried through adjusting the operation of the firm to expected changes in prices and to expected changes in the technological properties of resources.
2. The size of the firm becomes a function of how little or how much change is taking place and consequently the greater the stability of the economic phenomena im-

¹⁹ Kaldor *op. cit.* "For the function which lends uniqueness and determinateness to the firm—the ability to adjust, to co-ordinate—is an *essentially dynamic function*; it is only required so long as adjustments are required; and the extent to which it is required . . . depends on the frequency and the magnitude of the adjustments to be undertaken. It is essentially a feature not of 'equilibrium' but of 'disequilibrium'." p. 70.

²⁰ Albert Mighell working from the empirical side saw that managing a farm was primarily a dynamic function. See his study, *Why prosperity favors the large farm and depression favors the small farm*. Agric. Ec. Sec. Iowa Agric. Exp. Sta. (mimeographed). February 1933.

pinging upon the firm the larger we would expect the firm to become.²¹

3. The criterion that measures entrepreneurial success is to be found in adjustments which may be looked upon as consisting of two interrelated parts: (a) correctly anticipating the type of adjustments that are needed, and (b) the best way or method for making the adjustment.

A brief example of what would happen to the firm under static or even under stationary conditions, will make clear that the firm is not necessary unless there is change. Suppose that we were gradually to attain a stationary²² state of affairs in corn-hog farming. Crops of corn and all substitutes would be forthcoming as a steady and continuous supply. Each year the amount available would be the same. We might still have good and bad weather but the amount of drouth and flood, hail and storm, frost and heat, rain and sunshine would be precisely the same each year. The task of farming would be further simplified with no new weeds or diseases to combat, no additional soil losses to offset, no new hybrid seeds or machinery to upset production. This would be the poet's idyllic dream! Market outlet also would be constant. The demand for bacon, lard and pork would remain unchanged. Hog prices would always be steady and transforming corn into hogs would always bring forth the same product. Nor would the age and competence of the farmer and that of his family change! In such a stationary state what indeed would there be left for the farmer to decide? Wouldn't his task be virtually decisionless? He would merely repeat what he had done previously. Management would become routine supervision. This, however, is remote from the production realities as they are experienced by farmers.

The import of all this is significant to an understanding of

²¹ Kaldor. *op. cit.* "In relatively 'quiet' times, i.e. in times when tastes and the rate of saving are steady, technical innovations rare and changes in the population small, we may expect actual size of 'representative firms' to expand." p. 74-75. However, there are certain kinds of risk which can be handled best by consolidation. Where this is true the firm may be forced to expand in order to minimize such risk. See Knight: Risk, uncertainty and profits.

²² I elect for the example, the stationary state because it is less exacting in its presuppositions. It permits some dating of economic events and accordingly introduces certain dynamic aspects, that is, it permits periodicity in production and in consumption, the requirement being that the changes be of a regular and reoccurring kind and follow an exact and known pattern.

the primary function of the firm. In a word, it means that if you decrease the number and magnitude of dynamic changes you expand the potential scale and scope of the firm. Remove dynamic changes and you will have taken away the need for the most significant production decisions. Without dynamic changes the size of the firm becomes a meaningless concept²³ for the firm would disappear as a planning and administrative unit in production. All that would be needed would be technical plants each carrying on production according to the pattern of the past, repeating and re-repeating what they had done before.

We conclude that what we know as the firm is the product of dynamic conditions and it must be examined in terms of a dynamic setting. We will therefore proceed into an economy in which there is change and disequilibrium. We will look upon the firm like the biologist does upon the cell. We will make it our smallest basic action unit in studying production.

III. Firm Makes Plans and Acts

My next step will be to examine the structure of the firm as an action agency. My purpose will be to point out some of the more fundamental rules which underlie the trial and error procedure which are followed by the entrepreneur as he seeks to keep his firm in equilibrium as the operations of the firm are adjusted to the changes which arise. The analysis will be given in two parts. In this paper I propose to show how the firm plans its production when adjusting to changes where expectations are definite and precise. In a subsequent paper I will examine the production adjustments of the firm when in addition the entrepreneur is faced with risk and uncertainty, i.e.,²⁴ when either or both the nature and magnitude of the change are not fully known to the entrepreneur.

First then, let us take up those principles of analysis that apply when change has occurred or is anticipated with the proviso that there is no uncertainty as to the nature of the

²³ Kaldor *op. cit.* " . . . in a full long-period equilibrium (in Marshall's stationary state) the task of management is reduced to pure 'supervision,' 'co-ordinating ability' becomes a free good and technically optimum size of the individual firm becomes infinite (or indeterminate)." Pp. 70-71. In an interesting article, Hillman, H. C. Size of the firm in the boot and shoe industry, p. 292, the *Econ. Jour.*, June, 1939, shows how fashion production of shoes complicates the managerial task and thus limits the size of firm.

²⁴ I have in mind at this stage the distinction between risk and uncertainty drawn by Professor Knight in Risk uncertainty and profits.

change. With this step it becomes necessary to time both the inputs and outputs. Each production operation of the firm must be dated. This dating of the component parts of the stream of outputs and of inputs therefore introduces the element of time as a specific variable into the scheme of analysis.²⁵ The research technique required in farm management to cope with the dating phase of the problem is quite drastically different from that which has been available to us from static analysis.²⁶

It will be possible, however, in such a scheme to use much of the apparatus that has been developed for handling the static problem of combining resources.

To facilitate our analysis it is necessary to introduce three methodological devices, namely (a) price and technical expectations,²⁷ (b) the production plan, and (c) the time span of the production plan.

It is through price and technical expectations, that changes in taste, techniques and resources are transmitted to the firm. These expectations, accordingly, act as a barometer of all of the economic changes which impinge upon the actions of the firm from without. The farmer as entrepreneur must do two things. He must formulate the price and technical rates that he expects. He must then develop a production plan based on his expectations which will give him an optimum use of his resources. Expectations cover the first and the plan covers the second.

The more difficult and also the more important of these two categories of decisions, both to farmers and other entrepreneurs, is the formulation of expectations. For this reason should not research in farm management give major atten-

²⁵ Hicks, J. R. *Value and capital*, chap. 9, page 115. Hicks' method of analysis which we shall follow quite closely is to call Economic Dynamics those parts of economic theory where every quantity must be dated. R. F. Harrod in his review of Hicks' book suggests a definition for dynamics along lines of its analogy with mechanics. June, 1939, *Economic Journal*, pp. 294-300.

²⁶ I do not want to infer that attempts are not being made in farm management studies to date the events involved in production. In fact the basic assumption underlying all of the outlook work in agriculture is precisely that of timing production. However in spite of over a decade of outlook programs carried out by extension economists the research economist (often the same individual on a given campus) has not oriented his farm management research to provide a research basis for determining how farmers may time their production operations better.

²⁷ By technical expectations we shall mean the expected outputs from given inputs. These are never given data to the farmer. Nor are they constant. We shall refer to these input-output rates as technical rates.

tion to this phase? Inasmuch as there is in reality a considerable element of risk and uncertainty in whatever expectations are formulated, we will defer the discussion of the method of arriving at such expectations until later. We will assume at this stage in our analysis that the farmer has made up his mind as to what prices to expect, both for the products which his firm is in a position to produce and the resources which his firm buys, and also, what technical output to expect from the resources available to his firm. With this information it is possible to provide a rigorous analytical solution which will give the best use of his resources.

As a matter of experience we know that farmers do work out in their minds fairly definite production plans. The time span of such plans is determined (1) by technical conditions, and (2) by the period of time that it is expected will elapse before subsequent changes are likely to occur which will necessitate altering the production plan.²⁸ To illustrate the notion of technical limitations, it takes longer to produce beef cattle than it does chickens, longer to grow timber than it does corn. Investment in drainage calls for a longer time span than does money spent for fertilizer. Surprisingly little is known about the technical time effect of the various resources employed in farming. How much leeway does the farmer have in shortening the time span of his plans? This type of flexibility becomes extremely important as uncertainty increases. I will show later that the greater the uncertainty, the more nearly one must approach a state of planlessness, for uncertainty places a premium upon a short time span or flexibility in production.

I return, however, to the selection of the particular production plan from the alternative plans which are open to the farmer. We assume that his expectations are definite and

²⁸ Tinbergen has introduced the notion of an economic horizon. This notion as he uses it seems quite appropriate for the general expectancy complex that impinges upon the entrepreneur on the bases of which he formulates the probable expectations and thus it has a direct bearing on the time span. Tinbergen's horizon, however, is not equivalent with the time span that I have introduced. The economic horizon may be shorter than the length of the time span required by technical circumstances to produce a given product and while no new firms would enter an industry at such a time the going firms already in that industry must make plans conditioned by the technical characteristics of the resources that they are bound up with. See J. Tinbergen, *The notion of horizon and expectancy in dynamic economics*. *Econometrica*, 1: 247-264.

precise and that he has determined upon a time span for which the plan will be operative.²⁹

The highest profit combination is not difficult to understand in statics, but a production plan which runs a year or for any given time span is seldom made up of a single surplus, but, instead, it is made up of a stream of surpluses. Milk is sold each day; eggs at least once a week; and hogs several times a year. We may, accordingly, generalize and say that the production plan which the farmer develops and follows is made up of a stream of inputs and a stream of outputs, and that it is his aim to maximize the resulting stream of surpluses. It therefore becomes necessary to measure which of several streams of surpluses, resulting from alternative plans, is the greatest. For if it is not possible to measure alternative streams of surpluses, it would not be possible for the farmer to determine which production plan available to him is the best. The first approximation that suggests itself would be to compare the estimated total value of all of the surplus items in each stream. This procedure, however, over-values those surplus items that appear late in the stream relative to those that become available early. Quite aside from the element of risk, a surplus item that is available to the farmer this month is more valuable to him than the same surplus item a year hence; the difference being the discounted value of the later item. The basic criterion, therefore, for measuring whether one stream of surpluses is greater than an alternative stream, is its capitalized value. Each production plan that the farmer may undertake has at the time that he undertakes it, an estimated capitalized value. The

²⁹ What I have elected to call the time span of the farmer's production plan is not identical with Marshall's particular Day nor with Hicks' Week. Hicks defines his Week as a period of time during which variations in prices can be neglected. He subsequently uses that as a uniform period in the sense that he examines the general equilibrium results when all producers and all consumers proceed to make their plans as the market opens on Monday morning. Our concept does not require that each producer's plan be synchronized in such a way that each be remade on a given day. We would prefer to leave the concept essentially open and let the actual facts as we find them determine what length we are to ascribe to this span. It is strictly a question of fact whether a particular producer's plan is long or short. We will find that within each farm there will be running along simultaneously as parts of a master plan subordinate enterprise plans of various lengths. How long and how flexible they are are questions for empirical observation to decide. The scheme of analysis that is herein presented permits the handling of the plans regardless of their length or complexity.

farmer will prefer that particular production plan whose present capitalized value is the greatest.³⁰

One further comment on the alternative plans from which the farmer may select. The various plans available to him differ in that each requires a different series of adjustments of production within the farm. At the time the plan is made the farmer has at his disposal a bundle of resources made up of raw materials, products partly finished, other products finished but not yet sold, an equipped plant and experience. He has, in fact, a going concern, producing (say) milk and cattle, using concentrates, roughages, sheds, and other capital equipment and fairly expert family labor. If his price expectations have changed it is necessary for him to develop a new production plan. Let us assume that his expectations are that cattle prices will rule higher relative to milk prices than they have in the past and that roughage prices will decline relative to feed concentrates. With this situation he may, in developing his plans, do one of three things: (1) substitute the output of one product for another—plan to produce less milk and more beef; or (2) substitute one of the inputs for another—use less concentrates and more roughage; or (3) increase or decrease one of the inputs and one of the outputs at the same time—feed more roughage and produce more beef, feed less concentrates and produce less milk. These combinations will be recognized as being the same as those that apply to determining the highest profit combination under static conditions.

The technique involved, however, differs in this important respect. Each item in the stream of outputs must be treated as a different product, that is, beef cattle sold this month are treated as a different product from those sold next month. Similarly, inputs of different dates must be treated as different resources although each input unit may be exactly the same physical amount. Furthermore, as already indicated, actual prices are not used. We take instead ex-

³⁰ The idea goes back to the work of I. Fisher. For a full and lucid exposition see Hicks', *Value and capital*, Chap. 15. Hicks also takes up the influence of interest expectations. In a more comprehensive analysis of production and consumption this is necessary, however, in farm management research it is likely that the effect of interest changes upon farmer's production plans is unimportant. The interest rates which farmers expect are nearly always the current rates, that is, the farmers expect the current rates to continue during the time span of the plan. Where long term commitments are made, risk overshadows prospective change in interest rates rather completely.

pected prices and because a time span is involved we must use the discounted values of the expected prices.

How much worthwhile accuracy is gained by using the discounted values of expected prices is, of course, directly dependent upon the length of the time span and upon the distribution of the stream of inputs and outputs. The longer the plan and the more of the inputs that come early in the plan to be transformed into outputs to be sold late or at the end of the plan the more important becomes the discounting feature of expected prices.

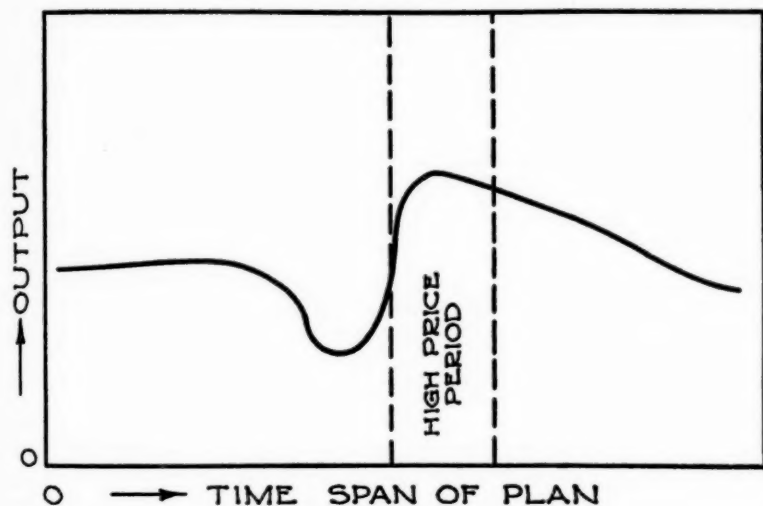


FIG. 1

Undoubtedly of more practical significance is the distribution over time of the items of inputs and outputs. To illustrate, if the price of milk is expected to be at its best level in a given month, how may a farmer adjust his daily operations to this type of price expectation? He may substitute earlier outputs (products) for added milk production in the month of high prices. This may be done by timing the freshening of the cows and building their physical fitness looking towards maximum production in the high price month. During the month he may force production somewhat at the expense of subsequent outputs. The accumulation of stocks of milk is, of course, technically impossible. The shape of the output curve in this case might well look as figure 1.

Empirical studies will be necessary to give content and concreteness to the abstract outlines of what the producer's plans consist. The production plan becomes an analytical tool. It makes it possible for those in farm management work to come into closer grips with the realities of the farm. It is an instrument of considerable promise. It will, however, require much painstaking investigation to determine types of input-output streams; to find out how the determinates of the time span operate; and to discover the range of choice open to the farmer in making plans when he must date the resources to be acquired, operations to be performed and products to be sold.

The economist who seeks to understand the over-all production actions of producers in agriculture will address himself to the query, what do farmers plan to produce with given price and technical expectations and how do the results square with the plans with which they started? The price response studies have been an attempt to measure one phase of this group action. The economist who is trying to increase the internal operating efficiency of the firm will want to examine the production plan in order to measure how far it falls short of being the best possible plan that was open to the farmer in view of the price and technical expectations from which he started.³¹ Farm management studies in this area should increasingly provide rules which will make more effective the essentially trial and error procedure by which farmers try to maximize the capitalized value of the stream of surpluses for the time span of the plan.³²

A digression appears warranted in order to make a further observation on empirical studies. It would seem that regardless of the objective and technique with which farm

³¹ Equally and probably more important (as noted by Elkinton) is to help the farmer arrive at more rational expectations before he has allocated or reallocated his stream of assets into the form of more or less fixed resources. Once his assets are committed the original expectations are only of secondary importance for the problem at a later date becomes one of how much can he salvage in view of his first errors. This brings in the whole problem of risk and uncertainty which we are leaving for another time.

³² See John M. Clark's essay, "The relation between statics and dynamics," in *Economic Essays in honor of John B. Clark*, p. 56. "Since intelligent choosing is so largely a matter of 'trial and error,' it is important to ask how the errors operate, how they correct themselves (if they do so) and what happens if they do not." Mighell's study already referred to (see footnote 18) is of this type. Mighell was pioneering a new field. The necessary theoretical formulation of the economic problem was not available to him.

management studies are started the worker all too often lets himself become hopelessly snarled or immersed in accounting and technological details. Fundamentals are forgotten, moorings are snapped and a purposeless drift sets in. Again and again, columns upon columns of figures are collected which do not have any significant bearing to the economic problems of agriculture either within or outside of the firm.

A nice practical question, which deserves much more thought than it has received, presents itself. How worthwhile is it to try and determine physical input-output "constants"? A good deal of effort is now going into this sort of thing. There are, however, I am convinced, a number of reasons for believing that it is a poor use of resources for agricultural economists to try to work up these constants. I would point out: (1) These sought-for rates of transformation are basically questions of technology.³³ (2) In agriculture both the resource that is used and product that is produced are almost without exception complex units highly variable in their composition. For example, take cows and acres of pasture and determine the rate of transforming grass into milk. An acre of pasture is a composite of literally a multitude of variables, likewise the cow. Accordingly how worthwhile is it to attempt to determine agricultural production functions since there is virtually an endless number of input-output rates, not only for cows and pastures, but for virtually all resources? (3) When the units of input and output have been refined and classified into essentially homogeneous categories they have little or no relevancy to the kind of transformation that goes on in farming. Presumably when the agricultural technologist gets down to cells, atoms and substances there is enough stability of behavior to warrant speaking of "constants." Yet when this stage is reached the technologist has abstracted away nearly all that is significant to the farmer in combining his resources. (4) The controlled conditions associated with agricultural experimentation do not have a counterpart in most phases of farming. The findings which the chemist has worked out in his laboratory are usually

³³ Technological research is primarily in the province of the production specialist in our Land Grant colleges. They, however, have not addressed themselves to that technology found on farms and thus there is an important gap in the information in this area. But rather than using our resources to obtain this information the task should be shifted to the production departments thus saving our resources for more strictly economic studies.

tried out and adapted to practical industrial conditions in pilot plants. The engineer may often go directly from his experiments to factory conditions. The reason is simply that in much of industry many more important variables are subject to control than in farming. In this respect a cement plant or steel mill differs radically from a farm producing crops and livestock where weather and disease play an important part. (5) To search far and wide for universal input-output constants (average unit requirements) for agriculture is to repeat the legend of the alchemist who sought the formula to convert baser metals into gold. I see no reason for presuming that such constants exist in reality. The rates of transformation in most of agriculture are about as variable and changeable as prices. Input-output rates change from year to year—given a cold spring and the number of pigs saved drops; with a dry August corn yields are cut. These rates vary widely within the year—sows farrowed in February save fewer pigs than those that farrow in June. Again there is much difference from region to region and between farms in the same area. With technology constantly changing, with many significant conditions that effect these rates not subject to the control of the farmer and with a great area of imperfect knowledge as to what his action in combining resources will produce, it would be about as meaningful to presuppose that farmers deal with constant prices (if we only could discover the formula!) as it is to presume that they somehow must be dealing with a set of constant input-output rates.

This digression therefore brings us back to expectations. We have argued that in the technological and resource sphere the input-output rates that the farmer is dealing with are also subject to much change. The output that he will realize from his inputs is not given. It follows that what is important on the physical side in farming is not what input-output rates are possible under controlled laboratory conditions but what technical rates are possible in practice and which the farmer expects. It is the latter that enter into his decisions and plans. It is these that must be ascertained if we are to predict the actions of farmers. These expected technical rates, however, will probably vary significantly from farm to farm within any given area or type.

IV. Introduction to the Nature of Expectations to the Firm

It was convenient in working through the analysis of the production plan, giving effect to changes that were impinging upon the firm to leave until now the important problem of the nature of price and technical expectations. Another reason for following this order of presentation arises from the fact that there are many unsettled theoretical issues; hence accepted theory does not provide us with a scheme of analysis. In the previous section we drew heavily upon Hicks. His handling of production analysis of the firm under given dynamic conditions is an important step closer to the production process of the real world compared to the analytical techniques provided by the more strictly static frame of references. It will be necessary, however, to take still another step in the direction of reality. Common knowledge suggests that we need to relax the assumption of perfect expectations. We know that the prices and outputs which farmers expect are at best probable, very often nothing more than guesses, and sometimes even only hunches. Economic theory, however, is not able to give us much help. Quite the contrary, it would seem that empirical studies will have to be made in this area to guide the development of useful theoretical approaches.

The price and output that is realized by the firm is usually something different from what was expected. The divergence between expectations and realizations is a highly important matter from a practical point of view. Presumably it will also be significant to theory once we have succeeded in providing a systematic scheme for treating them. These divergences are mistakes which the firm made, because expectations on which production plans were based were wrong. They are evidence of resources badly allocated, wrong investments having been made, certain enterprises over-extended and others not given enough support. The result of all this is that there occurs a loss to the farmer and a waste of resources generally. Society is poorer because of these mistakes. They represent a non-economic use of the nation's resources.

One is prone to ask why it is that farm management has quite completely neglected this important area of waste. For a farmer to have diverted too much of his resources into

hogs and not enough into cattle because he expected hog prices to rule higher relative to cattle prices than they turned out to do, is as clearly an example of wasted resources as if he drove the tractor the long way home from the field or tried to feed more roughage to (say) his hogs and chickens then they were technically able to digest. Yet relatively little has been done in farm management to try to show how it might be possible to reduce this divergence between expectations and realizations, in spite of the fact that the gap between them is a positive measure of what is probably the most important source of inefficiency and waste in present-day farming.³⁴ Moreover, one may safely predict that no one would welcome assistance and guidance on how to lessen these divergencies as much as the farmer, for he is quite aware that his most costly mistakes can usually be traced back to faulty expectations. If expectations were perfect I am sure most would agree that the chief economic problem of the firm and the farmer as entrepreneur would disappear.³⁵

It is in the imperfections of expectations that we come into contact with the more important real production problems and also the more difficult analytical problems of economics. This paper has been in a sense preliminary to an examination of the nature of expectations. We have found the firm to be an action and planning agency originating out of dynamic circumstances. We have given a methodological basis for analyzing the actions of the firm when definite and precise expectations are assumed. We have noted, what is common knowledge, that the prices and technical rates which are realized are seldom those that were expected. This divergence between expectations and realizations represents waste, an uneconomic use of resources. Thus we end with the query: why are expectations imperfect and what can be done to lessen the imperfections? The treatment of the issues that this raises must be left to another occasion.

³⁴ Again let me emphasize that the agricultural outlook has had as its aim the reducing of this divergence thus bringing about a better allocation of resources within firms. However, little has been done to examine the farm management implications and procedure for getting realization and expectation closer together.

³⁵ Hutchison, T. W., *The significance and basic postulates of economic theory*, London, 1938. Chap. IV, p. 85. One of the fundamental assumptions that is postulated is "... that all expectations are perfectly correct. They therefore pass over all the problems of economy in the world as it is, which may be said to arise from precisely this factor of uncertainty and imperfect foresight."

DIFFERENTIATION IN MARKETING FARM PRODUCTS

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ANYONE who studies the market for any consumer's good that is in general use will note the efforts made by merchandisers to reach consumers at different income levels. Any firm selling to consumers will select such bases of differentiation as seem necessary to it in order to reach effectively the various strata of consumer income that it seeks to tap. Some merchants will concentrate on products of high quality and price, and hence depend on consumers with high incomes. Others will sell cheaper products and give less service and so cater to lower-income groups. But an effective system for a widely produced commodity must reach all groups, if high consumption and the income possibilities of the market are to result. This conclusion is based on the three points: (a) Incomes of consumers vary widely. This causes wide variations in qualities and service demanded. (b) These variations create different strata of demand which can be served effectively only by some system of differentiation. (c) Monopolistic competition prevails in varying degrees in different branches of food distribution. This permits a wide variety of differentials to be established and maintained. For example, by effectively publicized brands, it is possible to create essentially separate markets for certain products.

The factors used to differentiate food products to reach different income groups might be classified as follows:

A. Service differentials:

1. Delivery vs. carrying by consumers
2. Cash vs. credit
3. Clerk-service vs. self-service
4. Packages vs. bulk
5. Accommodation to consumer choice vs. no choice
6. Carrying-in-stock vs. mail order
7. Ready-to-serve vs. preparation needed

B. Product differentials:

1. Quality: a range of choices
2. Size (where sale is by count)

3. Price of cut: a wide range of choices for products, like meats which represent the breaking up of a non-homogeneous whole
 4. Style: up-to-the-minute or out-of-date
- C. Advertising differentials:
1. Branded vs. unbranded
 2. Featured characteristics not necessarily indications of quality vs. standard grades
 3. Presumed uniformity vs. uncertainty or necessity for expert knowledge.

Variations in service in retail distribution are common to all products but different classes of farm products have certain peculiarities which create other bases. With meats, these are quality in its different aspects, high- and low-priced cuts, and brands and associated advertising. With fruits and vegetables, the bases are quality, packaging, and brands to a limited extent. With eggs, the basis is primarily quality, though size is also important. With butter, it is quality and brands with associated advertising. With bread and other cereal products, it is primarily brands and various factors identified with them, together with extensive brand advertising.

The writer studied in a small way the New York City milk market in 1923. He was impressed by the fact that three distinct merchandising classes of milk were of importance:¹ (1) Grade A bottled milk, which sold typically at a 3-cent premium over Grade B milk; (2) Grade B bottled milk, which made up the bulk of the wagon milk; and (3) Grade B bulk milk, which was widely sold in a variety of retail establishments in the districts inhabited by the poorer working class, at 3 to 5 cents under the price for bottled Grade B milk delivered to the consumer's dwelling. Each of these were aimed to tap the market at different levels of consumer income.

Recently Dr. Leland Spencer has reported on the differentiation which now exists in the New York City milk market.² Sanitary orders have eliminated the bulk-dipped milk, and new merchandising features such as irradiated milk and paper bottles have been added, but essentially the

¹ Cornell Agr. Exp. Sta. Bul. 445.

² Jour. Farm Econ. 21: 291. 1939.

same merchandising structure is to be noted: (1) a high-priced, high-quality milk to tap the market of the higher-income groups; (2) a lower-priced, somewhat lower-quality milk delivered to consumers to tap the middle-income groups, who will pay for delivery service; (3) a low-priced milk at stores to tap the low-income group who are unwilling to pay for service.

It so happens that the system in New York City best served the interests of the three groups concerned: (1) consumers are able to get what they want; (2) producers are able to sell more milk for human consumption; and, (3) milk distributors are able to increase their volume of sales and yet follow merchandising methods that involve service and advertising with the higher-income consumers. With all of the vagaries of public control of milk prices in recent years in the New York City market, the essential pattern has been retained.

Dr. R. W. Bartlett has shown how milk consumption varies among leading American cities.³ There is only one factor which high-consumption cities have in common: some way of making cheap milk available to low-income groups. This is the *sine qua non* of high consumption.

In the Boston market the availability of cheap milk sold through stores has been effectively reduced by price policies established by a state milk control board. Consumption of milk has only been maintained at anything like a figure comparable to that in New York City by extensive subsidy of the federal government through a plan which makes milk available at low cost to a selected group of families on relief.

It is doubtful whether any plan for selling milk that does not include provision for cheap milk will maximize sales in communities having a large percentage of low-income consumers. Moreover, it is doubtful whether public opinion in any market which has experienced cheap, low-service milk would tolerate its elimination.

This is not an essay on milk marketing and milk is used solely to illustrate a principle. A differentiated price system to reach consumers at different income levels has wide application. In the automobile industry, the more successful companies have a varied line at a range of prices. These new

³ University of Ill. Agr. Exp. Sta. Bul. 412.

cars together with second-hand cars at all prices fit the paying or borrowing ability of consumers at different income levels. The trend is still further in that direction; for example, the new middle-priced car of the Ford Company.

Although there are differences in size, power, and style in automobiles and in quality and service in milk distribution to explain price variations, the different classes of cars furnish the same service, transportation, and different merchandising classes of milk satisfy the same fundamental nutritional functions. Each separate merchandising class may, of course, be looked upon as a separate commodity in the economic sense. However, this fact is frequently not adequately recognized in discussions of the question.

What is needed for accurate analysis of retail price differentiation is an accurate measure of how different strata of demand respond to different price policies. Certainly the theoretical reactions of different groups will vary. At high-income levels a minor change in the price of a food item will not affect purchases; at low-income levels, it may have a decided effect. It is unlikely that many families in the high-income group would buy margarine within any conceivable limits of variation in the price of butter. But, statistics record a shift to margarine whenever the butter-margarine price spread widens. Presumably, most of this shifting is done within the medium- or low-income groups. In technical language, the demand for butter is inelastic for families with high incomes, and elastic for those with low incomes. Tests could be devised to determine elasticity at different levels. Presumably, many merchandisers have developed rules with respect to product elasticity out of their own experience, and probably there is much unanalyzed material in the files of business firms which would throw light on this point. If there were no differentiation, there would be no point to such analysis, as all prices would be reduced to one common level; but there is differentiation.

Since approximately two-thirds of our foodstuffs are sold to the upper half of the population, as measured by income, it is obvious that many food merchants will cater to the upper-income groups, as merchants are primarily interested in sales and profits.

What is the interest of consumer, of producer, and of the

government—as representative of the public—in this problem? The bulk of producers have a definite stake in measures which increase the volume consumed. There are, of course, exceptions to this but not many. Farm income studies generally indicate that increasing the total volume of business (sales) increases farm earnings, except in periods of unfavorable price-cost ratios. Hence, the farmer has an interest in market policies which make products available at low cost to consumers with low incomes. An elaborate merchandising structure designed to sell at higher prices to other groups is not of much concern to the farmer, provided that the system permits maximum consumption by low-income groups. An exception to this is quality differentiation. Producers of high-quality products have a definite interest in merchandising operations that sell maximum quantities of the higher grades.

Presumably the government, representing both producers and consumers, is interested in the maximum sale of all products. No other point of view can represent the general public interest. High consumption means better living and health standards, particularly among low-income groups, and more employment on farms and in the food-distributing trades. Hence, the real interest of the government must always be in measures that contribute to high consumption. It may be diverted from this position in response to pressure from some group interested in high prices but since high prices will reduce consumption, such diversion is clearly contrary to the national interest.

What is the consumer's interest? It varies according to the situation of the consumer: Some prefer quality and service to low prices, while others are compelled to give major consideration to price. As a group, they are entitled to choice—that is, to have available high and low service and all of the other bases for differentiation which the size of their community warrants.

What is the merchandiser's interest? Clearly there is only one answer to this question: To operate on a profitable basis. As individual firms they adopt policies which, in their judgment, will make possible the largest volume of profitable business. As a group, competition among them will develop the full degree of differentiation economically warranted by their community, provided no restraints are imposed.

Experience teaches that merchandisers like other businessmen will attempt to check, in so far as they can, developments which may harm their own position. In certain cities, the sale of milk in stores at prices which reflect the lower cost of this method of merchandising has been discouraged in various ways by interests which had a large stake in maintaining wagon-delivery as the single important method of distribution.

In such cases, the interests of the consumers, the producers, and the government run counter to the interests of established market agencies. The adoption of any method of distribution which is self-sustaining and which better serves the differentiated demands of a community should be encouraged. If necessary, it is the obligation of government agencies to maintain the freedom of economic opportunity which permits development of any method of distribution which can be self-sustaining.

The foregoing discussion may be summarized as follows: Consumers' incomes vary. This influences consumers' response to price and to service. In order to accommodate these various groups, there has developed much differentiation in service, quality, brands, and other matters. Merchandisers are interested in a system of differentiation that effectively segregates the different sections of the market so that all prices are not reduced to the levels needed to reach the low-income groups. High service methods, high quality, brands, and advertising are ways of doing this. The interest of farmers is primarily in maximum sales, except those who produce high-quality products, that appeal chiefly to high-income groups. Hence, farmers want a market and price structure which permits maximum sales to groups whose consumption is responsive to prices. The consumers want a system which permits them to select a type of product and service fitted to their needs or choices. The interest of the government is clearly to see that sufficient freedom is maintained to let any system develop which can be self-sustaining and to check any developments which tend to prevent the growth of new methods.

What is the application of all the above to specific problems? A few will be noted.

A large quantity of mediocre quality butter is made and

sold in the United States. Butter of high quality is produced in the dairy belt of the north central states but farther south a large quantity of fairly uniform but mediocre butter is produced. Why is this not improved? If the wholesale butter market is studied, it will be noted that there is now very little margin between prices of the medium and top grades. There is enough butter of the top grades to satisfy all the demands of those consumers who will pay a premium for it. Hence, there is not enough added revenue to the manufacturer of the medium grades of butter to enable him to pay the added premiums needed to encourage production of better butter-fat. It is doubtful whether any system of advertising or merchandising high-quality butter would induce the great bulk of consumers to pay a price high enough to warrant elimination of the lower grades. Among certain groups of consumers in cities where but little high-grade butter had been available, a wider market could be found for limited amounts of high quality butter provided the margin over cheaper butter was not too great, and the superior product was definitely identified.

In egg marketing, the situation is probably even worse because no manufacturing process intervenes as in butter, where by blending and standardizing, a rather uniform product is turned out. Freezing of eggs may operate toward standardization. There are, of course, large premiums for top-grade eggs, but unless eggs are really good enough to meet these premium grades, there is not much range in price, and hence little or no revenue with which to pay premiums to producers. Top-grade eggs will always come from producers and areas with sufficient volume to make it pay to be ultra-particular; the lower grades will come mainly from producers where poultry is a side-line, providing "grocery money."

The fruit situation is frequently discussed as though the remedy was to eliminate all but the top quality. If this were actually accomplished, it would mean reduced consumption, unless the price declined to the level at which low-income groups would buy. Many consumers will not pay premiums for quality in fruit or vegetables, simply because they cannot afford to do so. There are, of course, producing areas so remote from market that they cannot afford to ship any but

top-quality produce. But this market policy is not sound for the producer who has a market at his door. The correct thing for him to do is to sell everything which pays the cost of gathering. This variation in policy increases consumption of fruit as it permits the demands of different groups in the market to be served. Low-grade products must be marketed with a minimum of expense and they are commonly sold in bulk. Producers should, of course, not deliberately raise lower-grade products unless, by so doing unit costs are reduced to a point where actual profits are increased. Under most systems of production, some low-grade produce will be available for sale and the correct market policy will vary with the location of the producer.

Numerous comments have been made concerning milk in this paper. To maximize consumption, milk should be available to low-income groups through stores or other low-service outlets at prices which reflect the lower service. Sale in larger units and discounts for larger daily purchases are other devices for increasing consumption. There are, however, large numbers of consumers who want service and will pay for it. This leaves a large field for traditional distribution methods. Special grades which are distinctly above the quality needed for health protection provide opportunity for catering to demands of higher-income groups and serve both health and economic interests where health regulations do not interfere. Such grades permit premiums to be paid to superior producers, profitable merchandising operation by dealers, and the privilege of choice by consumers. However, health regulations in many cities permit but one quality of milk to be sold.

In meats, the wide range of quality which arises from the great diversity of producing conditions and variations inherent to production—steers, heifers, cows, bulls, and calves among cattle—together with the great diversity of cuts, provide a situation which permits different classes of consumers to satisfy their various demands. An understandable system of grades for identification of quality in retail shops would provide the consumer with a more intelligent basis for buying meats and would lead to more intelligent differentiation in sale of meats.

WHOLESALE BUTTER PRICES AND PREMIUMS

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THE recent butter stabilization activities, especially the 1938 program,¹ focused attention on some unique factors in marketing butter. When it was observed that premiums tended to disappear on a stabilized market, the question arose as to why. In seeking the answer to this problem a more fundamental question was involved, namely: Why, in the first place, do receivers in the eastern markets normally pay premiums over and above the market quotation? In other words, why is not the quoted price the actual price, as is usually the case for other commodities?

Perhaps all of these questions can be best approached by first considering a few generalizations regarding selling methods.

Settlement Methods

In the early days creamery butter was sold in the wholesale markets on a commission basis. Today virtually all butter is sold to receivers on the basis of an agreement. The receiver agrees to pay a price based on a specified wholesale quotation as reported at a specified time for a specified market.

The sale is thus an outright purchase—but it is a particular kind of an outright purchase in that the seller still assumes the risk of market price fluctuations. He is merely guaranteed a price based upon a quotation; a quotation which is yet to be established.

There appear to be several reasons for the transition from the commission type of transactions to the outright purchase plan. The most important probably was the gradual reduction or elimination of many of the marketing risks that once accompanied a sale.

¹ Reference is made to purchases by the Dairy Products Marketing Association, Inc. and by the Federal Surplus Commodities Corporation. The first named organization was set up in June 1938, when it was apparent that the butter prices would fall to unusually low levels without some support. Financed with Government funds, it purchased more than 113 million pounds of butter from June to November. During the last four months of the year some 26 million pounds were sold to FSCC for relief distribution. FSCC also purchased a somewhat greater amount from other sources for relief and to lend support to the market.

Butter was formerly much more heterogeneous as to quality. Storage facilities were poor, train service often slow and irregular, and there was risk of deterioration in transit before modern refrigerator cars were brought into use. Lack of adequate market information, particularly as regards wholesale prices, and lack of highly developed financial services also added to the uncertainties of the trade.

The second most important reason for the development of outright purchases was a dealer response to the demands of the sellers. Country creameries were skeptical of the commission system because of many abuses and evils which were brought to light, and the uncertainty of returns was somewhat of a sore-spot with the shippers.

A third factor, closely related to the first two, hinged on the nature of the receivers' business and the competition among them. Since some form of outright purchase appealed to the creameries, receivers offered such settlements in an effort to hold or gain volume of business. Bulk creamery butter is differentiated by an individual stencil mark on the package. A buyer who has established a profitable outlet for a given stencil mark naturally finds it to his advantage to retain his source of supply for that butter. To hold these creameries, buyers therefore not only offered the inducement of outright purchases—but also began to guarantee the shipper somewhat more than the wholesale quotation.

Butter is typically sold on a "delivered" basis, with all packing supplies furnished by the seller. For this reason any premiums result in a gross settlement price on the plus side of the quotation. For example, the sales agreement may be one-half cent over New York Extras, day of arrival, delivered New York in new wooden tubs for (presumably) 92-score butter. If, however, the settlement is calculated f.o.b. creamery or net at the churn (packing supplies furnished by the buyer) the premium, if any, is readily calculated by comparing the settlement price with the selling costs that would otherwise be incurred. An agreed settlement of two cents per pound under New York Extras net at the churn would therefore be, in effect, a premium if total packing and transportation costs were greater than two cents per pound.

But no matter how the premium is arrived at, it must be relative to a quotation. As the quotation is yet to be estab-

lished, it follows that the agreed settlement price must be based upon the level of a quotation which will be established on butter not covered by the agreement. Herein lies one of the most confusing aspects of the market. It involves the question as to what is the nature of that segment of the total supply on which the quotations are based and as to how these quotations reflect the equilibrium price in the market.

Basis of Premiums

The emergence of premiums appears to be the result of two closely interrelated peculiarities of the market: the nature of the receivers' business, and the manner in which the quotations are made. It has already been indicated that premium payments grew out of the system of outright purchases. They are, in effect, a competitive device developed by buyers in an effort to insure themselves particular marks of butter. A wholesale receiver, for example, may have an established outlet for a given creamery's make at, say, one cent over the quotation for Extras. If the receiver finds it profitable to handle the sale for one-half cent, he is better off to pay one-half cent over to the creamery rather than lose the business.

The significant fact is that the gross selling margin of one cent is based on a specific mark of butter. There is by no means complete interchangeability of butter which is traded in as Extras (or any other grade). Thus, if the first receiver did not pay the premium to the creamery, a competitor, also willing to handle the butter for a one-half cent margin, could induce the creamery to change outlets through a premium offer.

The fact that the spread obtainable is greater than the necessary handling margin involves a consideration of the quotations. Except for the West Coast, essentially all the agreed settlements on butter sales are based upon the quotations for New York or for Chicago. Private or trade paper agencies report the "spot" wholesale prices on the exchanges each morning at the close of the spot transactions.² These

² Government "spot" wholesale price quotations are also reported daily. These are based on trading up to 3:00 p.m. and are therefore not available for current transactions during the day. Moreover, the prices reported by each agency are nearly always the same for corresponding grades so that the settlement would be unaffected by the choice of the quotation.

become the basis for buying butter from creameries "on arrival" for the current day and for inter-dealer sales during the remainder of the day.

Since only a negligible amount of the total receipts of butter is sold over the exchanges, it follows that a little butter becomes the basis for settlement on all butter. We now return to the question raised earlier. In view of the preponderance of outright purchases, where does this small amount of butter come from for exchange trading?

Sprague,³ after close observation of the Chicago market, has suggested a logical answer in terms of what might be called day-to-day "surpluses" in the hands of dealers. While dealers have established outlets for the bulk of their receipts, either for current consumption or for storage, they can never have perfect adjustments between receipts and sales. Thus, buying or selling small amounts of butter on the exchanges permits them to balance their needs.

Naturally each dealer's excess is made up of what is, to his business, his least desirable lot. It follows that the butter which is available for price quoting purposes is also the least desirable lots in the market. From this point it is a rather simple step to one explanation of premiums. That is, the butter is so differentiated by the nature of the wholesale business that the quotations are based upon the least desirable and, from the standpoint of traders, the least valuable lots of butter. All other butter is worth more than the quotation and, for the competitive reasons discussed above, is paid for accordingly.

It should not be implied that the least desirable for any given grade such as Extras, necessarily means the lowest quality rating that will pass as Extras. It simply means least desirable because no profitable outlet has been found for it. It is true, of course, that high quality butter, uniform in make and available in long lines, is best suited to the traders' regular outlets; for example, a stencil mark that is known to have good keeping qualities commands the highest premiums during the storage season. On the other hand, butter of the same score on a fresh basis, but of doubtful keeping qualities,

³ Gordon W. Sprague is the local representative of the Chicago office for Dairy and Poultry Products, Bureau of Agr. Econ., U.S.D.A.

tends to fall into the surplus classification if no other current outlet is available.

It is also worthy of note that most of this butter has already been purchased on the basis of the quotation which it helps to make. It follows that if the receiver has agreed to settle for the butter for any price as great as the quotation, the sale results in a net loss by the amount of his handling charges. If any premiums were paid, the loss would be augmented by the amount of the premium.

The available evidence indicates that buyers do take small losses on these sales, but usually not to the extent of premium payments. As already shown, they only pay the premium in an attempt to hold the butter for a profitable outlet. If the exchange is the best outlet available for that particular butter, there is no incentive to hold that particular creamery. Receivers, therefore, usually make some of their outright purchases at or even below the quotation. Also, there has always been a certain amount of "free" butter in the market. Free butter means that it has been received without any previous agreement as to settlement price. Some of this may be sold over the exchange and remittance made to the shipper on the basis of the price obtained less a handling charge, thus augmenting the supply of butter available for exchange trading.

Direct Marketing

Beginning about 1920 and continuing to the present time, there has been a marked trend toward fewer and larger operators in the butter market and toward direct marketing channels.⁴ Food chains, cooperative sales agencies, meat packers, and a few large dairy and centralizer corporations now distribute nearly two-thirds of the creamery butter. The old line wholesale receivers on the central markets who formerly handled the bulk of the sales are of secondary importance.

No distinction has been made in the discussion up to this point between the different classes of receivers and their operating methods. Since these new-type large distributors

⁴ For a comprehensive treatment of this subject see: Nicholls, William H., *Post-War developments in the marketing of butter*. Iowa Agr. Exp. Sta. Bull. 250, Ames, Iowa, pp. 323-384. 1939.

either manufacture or purchase direct from country points most of their supplies and move them directly into retail channels, the central markets are becoming less and less important as trading centers. The question frequently arises whether this trend toward large direct operators has any special bearing on the existence of premiums.

Premiums developed with outright purchases in the central markets by the wholesale receivers. For this reason, their origin was independent of direct marketing. However, it would seem that direct purchases and large operators have played an important part in extending the premium system, first, because they have greatly expanded the practice of outright purchases and, second, because they have intensified the competitive conditions in the market. That is, direct marketing, to a large extent, represents inroads on the business formerly held by others. Direct purchasers have offered premiums to divert the butter from the central markets and the central market receivers have had to meet the premiums in an effort to retard the shift. Many of the latter have gone out of business through consolidation or failure. They are still important, however, in terms of absolute amount of butter handled because the new type operators have come into the picture during a period in which creamery butter production has been rapidly expanding.

A more nearly fundamental question remains; namely, is the general level of butter prices depressed through direct buying and other outright purchases which leave only a small amount of the least desirable lots of butter for exchange trading? Or does the fact that these large operators—using direct channels—are usually not the exchange traders mean that they do not help establish the quotations? Because of their size can they actually influence the level of quotations by their own action? These are similar to the controversies arising in connection with the effect of direct purchasing of livestock on the general level of livestock prices.

This phase of the butter market has not been the subject of special analysis and only an assumption can be made at this time. Probably, even though a small number of large operators handle a high proportion of the butter direct, the exchanges are the barometers which register adequately the

general demand and supply conditions. There is no apparent basis for concluding that the level of the wholesale prices has been affected by the recent trends in consolidating and integrating butter handling units.

There is, however, one important difference between the livestock and butter markets. Whereas it has not been established that the "cream of the crop" was obtained by direct livestock purchases, this is definitely true of butter. Thus, we have the premium system on butter to compensate the "cream of the crop." It is the quotation plus the premiums that make up the prices that clear the market. Undoubtedly certain types of receivers do manipulate the market somewhat to their own advantage to the extent of relatively minor and short time variations. It would require essentially unlimited resources to change the wholesale prices markedly for any length of time. For the most part, butter is bought and sold on the basis of the same quotation so that the income from day-to-day purchases and sales must be resolved to a handling margin.

Seasonal Factors

The day-to-day exchange trading is not necessarily augmented by the seasonal increase in receipts. During the flush season the original receivers store varying amounts of butter for their own trade during the short season and their customers frequently store for future needs. Operations of this type are mainly part of a merchandising program in which the handler wants to be assured of having the butter from particular creameries for an established trade.

In addition to the butter merchandisers of various types, there are a number of operators who specialize in storing butter and are active in the market only during the storage season. They afford an outlet for butter which is not currently consumed or stored by the original receivers. For these reasons, butter moving into storage is roughly comparable to a regular established outlet from the standpoint of premiums.

In fact, there is much to indicate that the gains from storage may be a more important source of premiums than the margins on current purchases and sales. The most con-

clusive evidence is that storage specialists and others not only continue to pay premiums during the storage season, but may actually boost the normal premiums in an effort to obtain specific lots of butter. Apparently the normal spreads between the quotations at the time the butter is purchased and the time it is taken out of storage are sufficiently wider than the carrying charge to permit premium payments. It is similar to the current transactions described earlier in which butter is bought and sold on the basis of the same quotation for a given day at a spread that makes it more profitable to pay a premium to the creamery than to forego handling the butter. The only difference is the time element, the widening spread more than offsetting the costs associated with time.

Logical analysis would indicate that in the long run the spreads in the quotations would just cover the cost of storage, consideration being given to the going rate of earnings to the investors. To account for premiums on these operations we have only to remember that the butter which is stored is not interchangeable with butter used as a basis for making the quotations in which the spreads occur. Generally speaking, storage butter is not a random selection. It is rather a choice based upon the known keeping qualities and other characteristics of specific stencil marks.

In spite of the fact that there is some basis for a seasonal increase in premiums at the beginning of the storage season, most creameries report uniform premiums throughout the year. What probably happens is that receivers pay premiums based on what they can afford to pay on the average for one year's operation. In other words, most of the variation from season to season may be reflected in the earnings of the traders rather than the premiums paid shippers.

Type of Package

Any discussion of premiums would be incomplete, if not misleading, if some attention were not given to the relationship between the settlement and the type of bulk packages. "Spot" wholesale quotations for New York and Chicago apply to butter packed in new wooden tubs, the standard bulk butter container. In recent years there has been an in-

creasing tendency to substitute less expensive packages for certain types of outlets. Fibre boxes and reconditioned wooden tubs are especially important. But when the cheaper package is used, the settlement is ordinarily adjusted downward.

A receiver, for example, may offer to pay one-half cent over the quotation for butter in a new tub or one-fourth cent over for the same butter in a fibre box. This difference tends to adjust for the differences in the margins he can obtain on disposition of the butter and may or may not represent the difference in packing costs to the shipper.

Most references to the higher price on the new wooden tubs place the emphasis on the demands of the trade for this type of package. Because the quotation is based on the new tub and the selling margin is also dependent upon it in many instances, it is frequently argued that the package as such has nothing to do with the premium. But one important point must not be overlooked. The new wooden tub has a resale value. When a receiver buys butter, he buys the container as well as the butter. It is true, of course, that the original receiver, except to the extent that he is printing butter, loses the package. The fact remains, nevertheless, that it becomes the property of the final user and has a ready market value. It seems inescapable that this value would be reflected in the settlement price paid the creamery.

Effect of Price Stabilization on Premiums

During the summer of 1938 when price stabilization purchases were an important feature of the market, the premium system underwent pronounced changes. In short, a general reduction or elimination of premiums accompanied the program. This happened because butter sold for stabilization purposes was sold at the quotation for the grade involved.⁵ The effect on prices paid shippers was the same as when dealers ordinarily sell small amounts of butter over the

⁵ Butter purchased for stabilization purposes was either purchased direct by D.P.M.A. on the basis of official Government grades or purchased over the exchanges on the basis of exchange grades. While the price of any lot of butter could be affected by the grades established under each method, once the grade was determined the sale was consummated at the quotation for the designated grade.

exchange. It has already been demonstrated that there is no basis for premiums on these sales.

In view of the large volume of butter sold in this manner, the receivers could not or would not bear the losses that would have been involved in premium payments. Nor would they, for any length of time, make settlement with country creameries at the quotation and lose the amount of their handling charges. Thus, receivers began eliminating premium payments to creameries on stabilization butter. Instead they handled these purchases on a consignment basis—deducting a brokerage as their source of income.

There was, of course, no mandatory requirement on the part of dealers to sell butter to the stabilization corporation. The compelling force was rather an economic one. Whereas dealers who had developed an outlet for a particular quality of butter on a year around basis continued to store varying amounts of butter so as to be assured of an ample supply to meet their specific needs, dealers whose principal source of income was normally storage profits did not stand ready to take excess butter from the creameries or from the original receivers at the prevailing prices. And the amount of such excess butter became unusually large because of the unprecedented volume of production during the same period.

Selling large amounts of butter at the quotation also had its effect on other transactions. Since the quotation represented the value of this butter, receivers were just as well off to sell butter elsewhere at the same price. Thus, those buying on the central markets began to find offerings available at the quotation where they had previously paid a premium. By the same reasoning, those who had been making direct purchases from creameries at a premium found themselves at a disadvantage because they could buy butter in the market at the quotation. Or, what is probably more important, their competitors could. This situation led to a general reduction in premiums throughout the market. There is some information to indicate, however, that the premiums were not dropped as fast or to the same extent as the spread between the buying and selling prices. Thus, the program also had the effect, for a time at least, of squeezing down dealers' margins. Insofar as the stabilization butter was

handled on a brokerage basis, the receivers were, of course, protected from outright losses.

Conclusions

The purpose of this discussion has been to provide some explanation of the existence of premiums, and not to justify or condemn the system. The widespread existence of premiums can mean only that the wholesale quotations understate the true value of the bulk of the wholesale transactions. There is an increasing sentiment among traders and others that the industry would benefit from the use of a quotation which more nearly represented the value of each grade of butter. This is simply another way of saying that the premium system probably is not to the best interests of the trade. In general, devices which have their origin in competitive practices outwear their usefulness and react against the whole industry, once the practice becomes universal.

It is equally clear that the premium system inherently has certain pernicious effects from the standpoint of the seller. There are so many direct and indirect ways of introducing a premium into the sale that more or less confusion prevails among creameries as to their best outlet. There is ample evidence that creamery managers attach considerable significance to the apparent amount of the premium and may actually go so far as to place more importance upon it than on the actual net returns for the butter.

But whatever the undesirable features of premium payments, or any other important trade practice, may be, it is certain that any program designed to correct the apparent evils must rest upon a thorough knowledge of the fundamental reasons for the existing system. Unless all these conditions are understood, there is danger of advocating a new method which might work to make the situation worse. To legislate premiums out of existence, to take an extreme example, might be like burning down the house to exterminate a rat.

THE THEORY AND MEASUREMENT OF DEMAND¹

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THE impressive treatise of the late Professor Henry Schultz of the University of Chicago is in a sense probably the final word on the subject. It is the most important of all books and articles which deal with the derivation of statistical demand curves from time series. Hence it forms the end and climax of the important development in econometrics which started essentially with the work of Professor Henry Ludwell Moore of Columbia University, who derived Marshallian demand curves from empirical economic data which came in the form of time series. We should in this connection also mention the work of Professor E. J. Working,² which gives the best logical and economic treatment of the subject.

It cannot be denied that Professor Schultz's book is a careful and impressive piece of work which probably will be of lasting importance in a number of economic subjects to which it makes significant contributions. Those subjects are: the pure theory of consumer's behavior, especially with respect to complementarity and competitiveness of commodities; the derivation of empirical demand curves for a number of important American and Canadian agricultural commodities; the statistical technique of deriving empirical demand curves from time series data; finally a certain contribution to problems of agricultural policy in the United States at the present time.

Since Professor Schultz's book forms a veritable landmark in those fields it seems worthwhile to investigate in somewhat greater detail the fundamental contributions which it makes to economic and statistical methodology especially insofar as they are of interest to economists working in the agri-

¹ Schultz, Henry, *The theory and measurement of demand*, xi+817 pages. Chicago, University of Chicago Press, 1938.

² Working, E. J., What do statistical demand curves show? *Quart. Jour. Econ.*, v. 41, pp. 212 ff. 1927. *Statistical demand curves*. *Encyclopaedia of the Social Sciences*, New York, 5: 72 ff. 1931.

cultural field. Before we come to this point, however, we will give a short description of the content of the book.

Part one presents a careful critical history of the methods developed for the derivation of empirical demand curves. Chapter one gives an excellent account of the pure theory of demand and indifference curves. It is at present the best historical treatment we have in this field available in English. The only criticism which could be made is that the dynamic problems³ which seem to come more and more into the foreground and have been treated especially by the econometrists seem to have been somewhat neglected. Dynamic problems are economic problems which involve economic activity over time.

Chapter two deals with the empirical derivation of demand curves from time series. It presents clearly and in a masterly manner, the procedures of Professor Moore, Professor Leontieff and Professor Pigou. It lays the foundations for Professor Schultz's own method which is a variant of the ideas first presented by Moore.

Chapter three discusses the derivation of demand curves from family budget data. Again it gives an excellent account of this method which Schultz himself does not use in his book. It presents the method of Professor Pigou, Professor Frisch, Dr. Marschak and Professor Roy.

The previous chapters present more or less the historical background of the problem. Chapter four gives expression to Dr. Schultz's own views on the subject which he previously expanded in his former publications. The reader can here get an idea of the methods which Professor Schultz used in his own analysis of agricultural commodities.

Part two gives an account of the demand curves which Professor Schultz has derived empirically. He gives a careful analysis of these data and their limitations and then treats statistically the following commodities: sugar, corn, cotton, hay, wheat, potatoes, oats, barley, rye, and buckwheat. All the Marshallian demand curves are derived by the trend ratio and the link-relative methods and the results are carefully compared.

³ See for instance: Evans, G. C., *Mathematical introduction to economics*, New York, 1930, pp. 36 ff., 143 ff. Roos, C. F., *Dynamic economics*, Bloomington, Ind. 1934, pp. 13 ff., 24 ff., 53 ff.

Part three is probably an even more important contribution and deals with inter-relations of demand. A chapter on the theories of related demand presents a history of the theoretical developments in this subject. A study of inter-relations of the demand for beef and pork, inter-relations of the demand for sugar, tea and coffee in Canada and inter-relations of the demands for barley, corn, hay and oats, illustrate the case.

Finally, a chapter on the general theory of related demand discusses carefully the different definitions of complementarity. The example given for the practical application is the inter-relations of the demand for beef, pork and mutton.

An appendix gives the basic data which will be most welcome to the statistician who wants to check Professor Schultz's computations. Another appendix presents a treatise on the elements of curve fitting and correlation which is among the best writings on this subject, especially since it takes into account the modern developments of tests of significance as put forward by R. A. Fisher, J. Neyman and E. Pearson. This appendix is available as a separate publication. The bibliography is complete and will be of great use to both the economist and statistician.

There is no doubt that the agricultural economist, the consumption economist, the "general" economist, the economic statistician, the mathematical economist and the mathematical statistician will find a great deal of interesting material in their respective fields contained in Professor Schultz's book. We will discuss briefly, especially from the point of view of the agricultural economist interested in demand studies, the fundamental contributions made by Professor Schultz to economic and statistical methodology, and also will offer some criticism.

A. Contributions to Economic Methodology

There is no doubt that the economist has to be very grateful to Professor Schultz for the care with which he has assembled all the different theories and ideas relating to the pure theory of consumer's behavior. It is perhaps to be regretted that most theories are presented in a mathematical

form and hence not easily available to economists, without good mathematical training. Those who want to inform themselves on the most modern developments of the pure theory of consumer's choice without the use of mathematics can be referred to Professor Hicks' recent book on "Value and Capital"⁴ where all the mathematics is banished to the appendix. Apart from this shortcoming the only fault that can be found with the extensive treatment of this problem by Professor Schultz is that it does not take fully into account the most recent English developments which are contained in the later work of Hicks and Allen.⁵ Here we find probably a better solution for the problem of the definition of complementarity than the one presented by Professor Schultz and originally worked out by Mr. Friedman.⁶ The difference is, however, only slight. This particular part of the book should be read and studied carefully by everyone working in the field of agricultural economics or consumption who wants to keep himself informed about the modern developments in this subject which is among the most significant recent advances in economic theory.

Another point which unfortunately has been somewhat neglected by Professor Schultz, as we mentioned before, is the problem of dynamic demand curves, or, more generally dynamic utility theory.⁷ It may not be important for the particular purposes of Schultz but we feel that it should have been included in a more explicit manner in a treatise of this nature. A purely static point of view is much more easily defensible for the derivation of demand curves from budget data. Of course it cannot be denied that little can be done in this field without higher mathematics which go sometimes beyond the scope of the mathematics used in Professor Schultz's book. Hicks has shown in his recent book⁸ that the time has arrived for a consistent dynamic treatment of all economic problems and there is no reason why the field of demand or consumer's choice should be excluded.

⁴ Hicks, J. R., *Value and capital*, Oxford 1939, pp. 11 ff.

⁵ See now especially: Allen R. G. D. *Mathematical analysis for economists*, p. 513, J. R. Hicks op. cit. pp. 42 ff. London, 1938.

⁶ Pp. 614 ff.

⁷ Tintner G., *The theoretical derivation of dynamic demand curves*. *Economet.* 6: 377 ff. 1938.

⁸ Hicks, J. R., op. cit. pp. 115 ff., pp. 227 ff.

It is unfortunate that this failure to face the dynamic problem indirectly also has some influence on the statistical methods used by Schultz and induces him to break up his total period 1875-1929 into three parts and to calculate a regression equation for every part separately. Also the unfortunate habit of treating time as a "catch-all" probably goes back to this theoretical attitude. This means that he considers only parallel shifts of the demand curve and assumes its slope constant. But this brings us to a consideration of the contributions to statistical methodology.

B. *Contributions to Statistical Methodology*

Professor Schultz's book presents the most thorough, intelligent and modern treatment of the method of least squares to be found in the English literature. His mathematical appendix especially is a classic and has great value even apart from the specific application of the method of least squares to the fitting of demand curves. It is particularly significant that Schultz fully understands the importance of modern statistical methods and indicates the tests of significance. The incorporation of the fundamental ideas of J. Neyman and E. Pearson on testing hypotheses is particularly praiseworthy.⁹

Only tests of significance can help us to distinguish statistically what is valid from what is spurious. This, of course, is one of the most important problems in economic statistics as well.

But it seems that Schultz did not sufficiently grasp the fundamental importance of the problem of time series. He was too little aware of the fact that economic time series like any other kind of time series have some properties of their own and simply cannot significantly be treated with ordinary statistical methods which may be applicable to data which are not time series. The tentative treatment of time series from the point of view of the variate difference method¹⁰ (Student, O. Anderson) and the related method of

⁹ Pp. 211 ff., 732 ff.

¹⁰ Student, The elimination of spurious correlation due to position in time and space. *Biometrika* 10: 269 ff. 1914. Anderson O., *Die Korrelationsrechnung in der Konjunkturforschung*. Bonn, 1929.

serial correlations¹¹ (Yule and Wold) seems to have escaped Schultz's attention. The students who have tried to deal seriously with the problem of time series have realized that we have to distinguish two elements in the time series. The one which is random in the probability sense and can be treated in the same fashion as the random variations in other data, and another element which is specific to time series and may be thought of as a function of time. The treatment of time as a "catch-all" is certainly insufficient for dealing with this problem and future workers in this field will have to resort to somewhat more refined statistical methods in order to be able to treat economic time series intelligently.

It seems also that Henry Schultz has neglected to integrate his economic theory with the statistical treatment of his data. This again goes back to his reluctance to deal with dynamic problems. It seems that the problem of random fluctuations in economic time series can be dealt with intelligently from the point of view of dynamic economics.¹² One should think this is also the natural point of view for anybody who wants to derive statistical demand curves from time series data. Static considerations are probably sufficient if we use family budget data. The recent book by Allen and Bowley¹³ gives a good indication of the way in which this other problem could be tested.

It seems that from a theoretical and from a statistical point of view it would have been more promising to attack the problem of the statistical derivation of demand curves from time series data from the following point of view: Assuming a certain type of demand curve which seems reasonable from the standpoint of theoretical economics, one could make the parameters of the demand curve functions of time. The parameters are the constants which determine

¹¹ Yule, G. U., Why do we sometimes get nonsense correlations between time series? *Journal of the Royal Statistical Society*, 89: pp. 103 ff. 1926. Wold H., A study in the analysis of stationary time series. Upsala, 1938. This book gives an excellent summary and new developments. It was published after Prof. Schultz's death but is quoted here as the best work in the field.

¹² For an attempt in this direction see: Tintner, G., A note of economic aspects of the theory of errors in time series. *Quart. Journ. Econ.*, pp. 141 ff. November, 1938.

¹³ Allen, R. G. D. and A. L. Bowley, *Family expenditure*, London, 1935.

the form of the function in question. This again would only be a first approximation because it would really be necessary to explain in economic terms the time movement of these parameters which characterize certain geometrical and also economic properties of the curve. But it seems that such an approach would have made some sense as a first approximation.

To give an example, suppose for simplicity's sake that we are dealing with the linear demand curve: $Y = A + BX$, where Y is the price, X the quantity demand, A and B constants. (The idea can easily be generalized for any other type of demand curve which seems reasonable from an economic viewpoint.) Then the parameters A and B have certain geometric properties which can easily be interpreted economically. A characterizes the location of the demand curve, and B its slope. It would, of course, be easy to introduce some further parameter which for instance could characterize the curvature and other geometric properties of the curve which again could be interpreted economically. A good economic interpretation of these geometric properties of demand curves is to be found in the modern theories of demand as developed by Hicks and Allen and also reproduced by Schultz.¹⁴ There is no need of chopping up data into small parts in order to obtain a quasi-static demand curve for every period. The calculation of per capita demand and the deflation of the price with a price index, methods which Schultz uses, are also of rather dubious value for approximating static conditions.

We may assume instead, that the parameters A and B themselves are functions of time because population, technique, expectations, tastes and a number of other things change during the whole period. Hence, we will write our equation in the following form $Y_t = A_t + B_t X_t$, where now all our quantities are functions of time. (It would be still better of course, if we could explain the variation of the parameters in economic terms, for example, by correlating them with economically significant variables. But we present here only a first approximation to the real problem.) What

¹⁴ Pp. 40 ff.

functions of time the parameters are, of course can not be said offhand and will depend on our knowledge of economic conditions during the period as well as on inspection of the data. We can, however, derive from our new equation a system of normal equations which will give a least square solution and in this sense the best approximation to a dynamic demand curve.

But we should not be content with this result without investigating if the residuals are random. This can be done for instance by the variate difference method or by the method of serial correlations. Those tests, however, are still far from perfect. Only then will we be able to indicate standard error, to use tests of significance, and to see if the residuals are really random and if we have reached valid results. This problem of time series is by no means solved statistically and mathematically and a great deal of research of a rather complicated nature will have to be done in the future before an unambiguous answer can be given.

JAPAN'S AGRICULTURAL CRISIS

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TODAY, as in the past, agriculture remains the backbone upon which the economic life of Japan rests. The unprecedented progress of industrialization in Japan in recent years has tended to obscure this fact. In reality, however, the importance of agriculture in modern Japan is still very great. The rural population still constitutes approximately 45 per cent of the total; agriculture continues to be practically the sole provider of the nation's food, while with respect to invested capital and value of net output, agriculture is the country's leading industry.

The place of agriculture in Japan's national economy does not bespeak either rural prosperity or rural progress. On the contrary, it is commonly agreed now that it has been suffering from an ever-deepening crisis at a time when Japanese industry and trade have been expanding and prospering. The feudal concept that a farmer should maintain a low standard of living has continued to pervade Japanese agriculture to this day. It helped to keep the village in a state of contentment as long as agriculture could satisfy the frugal needs of the farmers. In recent years, however, Japan's agricultural economy has not been able to provide even this minimum for a great number of farmers.

This is attributed to numerous burdens that Japanese farmers must shoulder and which operate to their detriment even in "normal" times. Chief among these are the country's very limited arable area and the extremely small farm units; inequitable land distribution; widespread tenancy system; sharp price fluctuations; heavy tax load; huge indebtedness and exorbitant interest rates, and, in consequence of these factors, the very low standard of living of the mass of Japanese farmers.

The Problems

The characteristic feature of Japan's agriculture that has given rise to a host of difficult problems is the small area under cultivation in relation to the rapidly growing population. The utilization of the land is highly developed and "not

only the hillsides, but in some places even the mountain summits,"¹ are made to yield crops. The great efforts to extend the area under cultivation brought about an increase from 11 million acres in 1880 to not quite 15 million acres in 1936, or 16 per cent of Japan's total land area. The extension of land under crops in Japan was achieved mainly during the first three decades of the period under consideration; since then the arable area remained practically stationary. The topography of the country being generally steep and mountainous, there is at present but small undeveloped area which is suitable for cultivation.

The fact that Japan's 5,595,000 farm families cultivate less than 15 million acres indicates that the size of an individual holding is extremely small. If the land were evenly distributed each household would cultivate 2.5 acres. In reality, great numbers of Japanese farmers cultivate much less than 2.5 acres.

JAPAN: FARM HOUSEHOLDS ACCORDING TO SIZE OF CULTIVATED AREA (1936) AND TOTAL AREA CULTIVATED BY EACH GROUP (1933)

Arable land per family	Actual number		Percentage of total	
	Number of families	Area* cultivated	Number of families	Area cultivated
	Thousands	Thousand acres	Per cent	Per cent
Less than 1.2 acres. . . .	1,896	1,237	34.0	8.4
1.2 acres to 2.4 acres. . .	1,914	3,724	34.2	25.4
2.4 acres to 4.9 acres. . .	1,262	4,817	21.5	33.0
4.9 acres to 7.4 acres. . .	321	2,055	5.7	14.0
7.4 acres to 12.2 acres. .	127	1,333	2.4	9.1
More than 12.2 acres. . .	78	1,482	1.4	10.1
Total.	5,598	14,648	100.0	100.0

The Statistical Abstract of the Ministry of Agriculture and Forestry, 1936-37, pp. 1-3, table 1. * Estimated by Hidetoshi Isobe, Labor conditions in Japanese agriculture, Bulletin of the Utsunomiya Agricultural College, Section B, vol. 2, no. 1, 1937, p. 5, table 2.

Thirty-four per cent of all the households cultivate less than 1.2 acres each; 34.2 per cent from 1.2 to 2.4 acres; 21.5 per cent from 2.4 to 4.8 acres, and only 9.5 per cent cultivate more than 4.8 acres. The first mentioned group, comprising

¹ Shiroshi Nesu, Population and food supply in Japan, in Problems of Pacific. Proceedings of Second Conference Institute of Pacific Relations, Honolulu, p. 346. 1927.

1,896,000 families, cultivate an estimated total of 1,237,000 acres, while on the opposite end of the scale one finds 78,000 families who cultivate 1,482,000 acres of land. These figures reveal how small the holdings are and the extent to which a great deal of the cultivated land is found in comparatively few hands.

Japan's limited crop area precludes the concentration of land in great holdings. Official statistics record only 3,547 landowners with over 125 acres each, the average size of these holdings being 300 acres, and 46,000 with an area of from 25 to 124 acres, or an average of 57 acres. Notwithstanding the scarcity of large properties, there is a striking inequality in the distribution of landownership in Japan. Data of the Ministry of Agriculture shed little light on the exact distribution of landownership; it was estimated unofficially, however, that while 50 per cent of all the farm households own only 9 per cent of all the land, 7.5 per cent of the households own 50 per cent of the land.² The corollary of this is that the holding cultivated by a Japanese farmer does not correspond with the amount of land owned by the same farmer.

Many farmers own no land at all and many more own very little of it (2,556,630 farm households own less than 1.2 acres each). Under the circumstances they are compelled to rent land from those in whose hands it is largely concentrated. This has brought in its wake the development of tenancy in Japan on a large scale. At present, tenancy in Japan has reached a point where 54 per cent of the irrigated rice land and 40 per cent of the nonirrigated land are cultivated by tenants and part-tenants. On the whole, the two groups cultivate 48 per cent, or 7,200,000 acres of Japan's total arable land. Of the 5,597,000 farm households enumerated in 1936, almost 31 per cent were composed of independent farm owners, 27 per cent of tenants who owned no land at all, and 42 per cent of part-tenants and part-owners.

In the United States "tenants still move with some freedom up the agricultural ladder,"³ but in Japan tenants are

² Hidetoshi Isobe, *Labor conditions in Japanese agriculture*, Bulletin of the Utsanomiya Agricultural College, Section B, 2: (1), 6, 1937, table 2 (B).

³ Report of the President's Committee on Farm Tenancy, February, 1937, p. 5.

in no position to do so. The scarcity of land and lack of alternative occupations bind the tenant to the land—regardless of the high rentals. For rice land rent is paid in kind, while for other land it is usually paid in cash. The system of payment in kind is an added burden shouldered by the tenants. "It is all the heavier, too," a Japanese writer noted, "because of the arrangement whereby the tenant farmer pays his landlord so many bushels of rice per tan (.2 of an acre), and this amount does not change much, irrespective of whether the crop is large or small. In other words, the landowners are assured of a certain stabilized quantity of 'harvest' regardless of the yield."⁴

A survey of 9,134 villages by the Japanese Department of Agriculture showed that in 70 per cent of the cases the rental from a single-crop field constituted more than 50 per cent of the crop; from a two-crop field the rent is around 60 per cent of the crop. It may be noted also that, whereas the landlord pays only the land tax, the tenant has to pay a number of other assessments and dues, buy his own very expensive artificial fertilizer, provide the farm house, farm buildings, implements and seed. Under the circumstances a tenant's net share of the crop is considerably smaller than the above-mentioned figures.

The long-established landlord-tenant relationship continued till about the end of the World War without causing much open conflict, although the tenants were never satisfied with their economic status. But the growing agricultural distress, and the spread of ideas opposed to old-established concepts, brought about a decisive change in the attitude of the tenants toward the landlords. Since 1917 the number of recorded disputes increased from 85 to nearly 6,000 annually. The causes underlying the disputes are numerous, but the following two became outstanding: during the twenties, excessive rents; more recently, about 60 per cent of the disputes were due to attempts on the part of the landlords to evict the tenants from the land.

The economic welfare of the Japanese farmers is closely bound up with two crops, rice and cocoons. The traditional

⁴ Magohachiro Kimura, Japan's agrarian problems. Published by Foreign Affairs Association of Japan, December, 1937, p. 12.

practice of the rapidly growing Japanese population to depend largely on rice as the main article of diet caused more than half of the arable land to be devoted to rice cultivation. Because of the extension of acreage under rice and even greater rise in yield per unit of land, during the last 60 years total production of rice doubled, mainly from 155 million bushels to over 300 million bushels. In the past decade, however, the yield has remained practically stationary. Hence the suggestion that "Japan has just about reached the point where the returns on her agricultural efforts will begin to decrease irrespective of any added endeavors she may make to increase her production."⁵

The price of rice in Japan is characterized by sharp fluctuations, which alternately work havoc with the producers and consumers. The fluctuations are due to a variety of factors: crop conditions with a consequent shortage or surplus of rice; the fact that Japanese rice is consumed at home almost exclusively and it cannot be exported abroad at a profit, and that the consumed rice must be Japanese rice or that from Korea or Formosa. But whatever the causes, for nearly two decades the Japanese Government has been confronted with the problem of how to eliminate sharp price fluctuations in a manner that would reconcile the interests of both producers and consumers and allay the discontent engendered by it.

The silk cocoon crop is only second in importance to the rice crop. In fact, for a third of Japanese farmers it is the principal source of cash income. Whether the latter is large or small depends entirely upon the price of silk in the United States, where more than 90 per cent of Japan's raw silk exports is sold. The price is determined mainly by business conditions in the United States. This explains the precipitous drop in price from a record high of 10.6 yen per kwan (8.3 lbs.) at the close of the wartime boom in the United States to a low of 5.7 yen a year later. Chiefly for the same reason, and partly on account of increased competition of rayon, the price of cocoons declined from 7.5 yen in 1929 to 2.5 yen in 1934, which price was only two-thirds of the cost of production.

⁵ Shiroshi Nasu, *op. cit.*, p. 343.

The burden of debt shouldered by the Japanese farmers is a basic factor underlying Japan's agricultural plight. Prior to the World War the total debt was estimated at less than a billion dollars. Since then, the increased disparity between income and expenditure in consequence of the distressed conditions in the countryside led to a rapidly mounting indebtedness, estimated at 6 billion yen, or slightly over 1,000 yen per household. The net effect is that "Their (farmers') excessive debts are the most important of the causes which compel the present proprietors to dispose of their own land and reduce them to the position of proletarian tenants or wage laborers, whereas otherwise they would remain as the sound middle class of the farming population."⁶

Most of the indebtedness is carried at high interest rates. A survey prepared by the Japanese Department of Agriculture on the amount of loans to farmers by various financial organs shows that the Hypothec and Agricultural and Industrial Banks, established primarily to facilitate agrarian financing, accounted only for 14 per cent of the total farm loans. On the other hand, private banks and money-lenders accounted for 13 per cent and 56 per cent, respectively.⁷

As to interest rates charged, it was officially estimated that in 1932 nearly 43 per cent of the debt carried a rate ranging from 7 to 10 per cent; 51 per cent of the loan at a rate from 10 to 15 per cent, and the remaining at a rate of interest above 15 per cent. In reality, however, the actual rates are considerably above the official estimates. According to one observer "of his (farmer's) total loans, 57 per cent have been advanced by private lenders at a nominal rate of 12 per cent and a real rate said to be between 20 and 30 per cent."⁸

Japanese farmers have always been subjected to a heavy taxation burden. In feudal times this was epitomized in the saying: "The peasant is like a sesamum seed; the more you squeeze, the more you get." In modern times the process of exacting taxes from the farmers has been regularized and

⁶ Soshinosake Sagi, *The problem of farm debt adjustment*, Kyoto University Economic Review, p. 61. July 1937.

⁷ Setsuo Uenoda, *Farm problems in Japan* dates back to the early Meiji era. *Trans-Pacific*, March 8, 1934.

⁸ *The Times*, London, July 5, 1932.

⁹ Magohachiro Kimura, *op. cit.*, p. 7.

given legal form, but it remains true, nevertheless, that in Japan's economic scheme the farmers are still the main "beasts of burden." For this reason "the all-around progress from the feudal regime to the modern capitalistic system was achieved at the expense of farmers. The land tax, customs tax, consumption tax and local taxes were levied, whether intentionally or otherwise, as a means of facilitating this policy."⁹ This attitude toward the farmers has persisted to this day, despite Japan's rapid and very successful industrial development.

Conditions described in the foregoing paragraphs had been gradually undermining Japan's agricultural economy for many years prior to the depression, but the full significance of the fundamentally adverse factors was not revealed, chiefly because of the relatively high prices of the two staple products—rice and silk.

The first sign of a downward trend was noted in 1926; by 1929 the price of rice had declined 30 per cent and that of cocoons 37 per cent, with a similar contraction noticeable in other products. In 1929 the total value of agricultural output declined to 3.5 billion yen as against an annual average of 4.6 billion yen during the period 1919–1928. But the real slump came in 1930 and 1931, particularly during the latter year, when the agricultural output was valued at only 2.2 billion yen, or less than 50 per cent of the 1919–1928 average. The price disparity between manufactured and agricultural products aggravated the conditions of the farmers; the decline of commodity prices purchased by the farmers was less marked, and, as in the case of the all-important fertilizers, prices were actually rising. The rise in prices proceeded at a very slow pace, but it became more pronounced from 1935 on. The estimated 1938 value of agricultural products is some 300 million yen greater than that of 1929. But here, too, one must note that the rise in prices lagged considerably behind those of manufactured articles, thereby lowering the purchasing power of the rural community. Despite this adverse factor, farm prices recovered sufficiently to mitigate to a certain degree the immediate problems given rise by the depression, having at the same time unsolved the fundamental difficulties which handicap Japan's agricultural economy.

The question to consider now is what the Japanese agricultural situation means to the farmer in terms of earning a livelihood. An investigation conducted in 1927, a relatively prosperous year, of the income of 132 farmers who cultivated their own land, revealed the following: the total income of a farmer averaged 1,350 yen as against an expenditure of 1,315 yen, or a surplus of 451 yen. The reliance upon subsidiary occupations as a means of making both ends meet is a basic pillar of Japan's agriculture. A survey on farm incomes for the period 1913-1934 shows how widespread this practice is: "With the single exception of 1913, agricultural receipts fell short of meeting household expenditures, i.e., cost of living, and forced the farmers to fall back upon nonagricultural income to make up the deficit."¹⁰ The proportion of the income from subsidiary occupations to the total farm income ranged from 23 to 31 per cent.

The conclusion one is likely to draw is that for the majority of Japanese farmers, agriculture as such is not on a paying basis. The Bureau of Statistics of the Japanese Government was well aware of that when it stated that "the average part-tenant as well as tenant farmer can count upon a surplus only when the area of farm under his management is larger than 4.5 acres. The very fact that by far the largest number of Japanese farmers till an area of less than 2.4 acres is clear evidence of the difficulty of Japanese agriculture as a business."¹¹ Under the circumstances the question raised by Dr. Nasu "whether or not such high population supporting power [of the land] is partly due to a sacrifice paid by peasants in the form of a low standard of living,"¹² may be answered in the affirmative.

The Remedies

Prior to 1930 Japan's agricultural problem failed to attract serious attention, one of the important reasons being the farmers' inability to express their grievances in an articulate manner and failure to secure the support of the country's dominant political groups. But when, among other causes, that of the farmer also was taken up by the military, the

¹⁰ Hidetoshi Isobe, op. cit., p. 66.

¹¹ Shiroshi Nasu, op. cit., p. 198.

¹² Ibid., p. 196.

agrarian problem, to quote ex-Premier Saito, immediately "caught fire." In the attempted assassination of Premier Hamaguchi on November 14, 1930, resulting in his death a few months later, rural discontent played no small part. The motives behind the subsequent bewildering series of assassinations of Japan's leading political and industrial figures were tinged by a combination of military-agrarian interests.¹³ Considering the important role of the army in the nation's affairs, particularly after the occupation of Manchuria in 1931, it becomes clear why, in 1932 and after, every succeeding government of Japan became eager to placate the farmers.

In the attempts to stabilize the price of rice, government policies were directed toward maintaining prices at a level that would reconcile the producer-consumer differences. The origin of the policy goes back to post-war days, but its basic principles were definitely formulated in a law enacted on March 29, 1933. The Government was thereby authorized to fix each year a minimum and maximum price at which it stood ready to buy or sell rice in order to maintain the market price between the two fixed levels. The minimum was to be based on the cost of production and the maximum, on the cost of living. To carry out the chief provisions of the law, the Government established a special rice fund of 800 million yen, which could be increased to a total of 1,150 million yen.

This law, which proved to be a financial burden on the Government, was modified by the Autonomous Rice Control Law of 1936. In accordance with the provisions of the latter, the farmers were to be organized in local and federal Rice Control Associations with a view to storing the surplus of their rice. The Department of Agriculture was authorized to grant special bounties to cover storage expenses and to make loans at a low rate of interest against the stored rice. The surplus was to be held until such time as the current market price should rise above the minimum official price.

Efforts to assist the farmers through price control were only partly successful, despite the more than 200-million yen loss sustained by the Japanese Government in the course of

¹³ See S. D. Kennedy's, *The reactionary movement of 1932*, Contemporary Japan, March 1933. Minister of Finance, Inouye, was murdered on February 9, 1932; the managing director of the vast Mitsui interests, Dan, on March 5, 1932, and Premier of Japan, Inoukai, on May 15, 1932.

the operation of the rice laws. It may be argued, of course, that without government aid prices would have declined below prevailing levels but, from the rice producers' point of view, on many occasions prices were not sufficient to cover costs of rice production, much less a margin of profit.

The minimum price for rice now guaranteed to the producers may not satisfy them, yet they are assured of a certain income. A similar situation does not exist in the case of cocoons. Until very recently government attempts to aid cocoon raisers consisted chiefly of measures tending to improve quality and reduce costs of cocoon production. In 1935 and 1936 sales of cocoons were placed under government supervision, with the stipulation that the quality of the product offered for sale must meet with official approval.

On occasions, as in 1930 and 1931, farmers engaged in sericulture have secured loans from the Government amounting to 120 million yen. While intended as a relief measure, the Government utilized these loans as a means for controlling the cocoon crop. But the reduction in output was ineffective as a method raising the price of cocoons because of a lagging demand for silk. Since prices of cocoons are governed by prices of raw silk, the Japanese Government then promulgated numerous measures to increase silk prices. They included such devices as loans, subsidies, government purchases of surplus silk, and restrictions of silk output and silk sales. Yet, judging by price movements, all direct and indirect measures to raise cocoon and silk prices failed of their aim, and the prosperity of Japanese sericulturists still depends upon the rising curve of economic activities in the United States rather than upon any other factor.

Aside from the attempts to aid agriculture through various schemes of price stabilization, the Japanese Government concerned itself also with the problem of lowering cost of production. The main emphasis was upon cheaper supplies of artificial fertilizers. Because of the monopolistic character of the industry, fertilizer prices were rigidly maintained even during the years of severest depression, although prices of agricultural products were at record low levels. The complaints of farmers against this price disparity became so vociferous that on May 18, 1936, a law was enacted to cor-

rect the situation. The significance of the measure lies in the fact that the association of fertilizer manufacturers created by this law cannot make arrangements for controlling production, set up sales policies or fix the price of the product without the approval of the Government. Whether the Japanese farmers will be able, ultimately, to secure fertilizers at reduced prices remains to be seen; meanwhile, it should be noted that wholesale prices of fertilizers have been higher since the enactment of the law. The Sino-Japanese War increased the demands upon the industry, thereby stimulating a further rise in prices. It is not unlikely, of course, that prices would have been still higher but for the control measure enacted by the Government.

Farm relief in Japan has come to be closely identified with easing of the debt burden. As the crisis grew in intensity and the demand for aid became insistent, in 1933 the Japanese Government promulgated the Farm Debt Adjustment Act. It provided for the formation of farm associations with functions "to mediate between the creditor and debtor and make plans for redeeming the debts within 20 years by easing the conditions of debts through such methods as extending the period of redemption, establishing an annual installment plan, reducing the rate of interest, or scaling down the amount of the principal or of the accrued interest."¹⁴ Within a period of 5 years the Government planned to extend to the associations loans at a low interest rate, amounting to 200 million yen.

It may be inferred that the settlement of a relatively small portion of the farm debt was intended. Essentially, the Act called on the farmers to solve the problem by their own means, as may be noted from the following: "Resources for the redemption of debts should be supplied by the surplus [farm] income . . . and also by disposing of property which is not needed for the efficient following of the household occupation."¹⁵ Most of the Japanese farmers, however, were heavily in debt precisely because of a lack of surplus income. Thus the chief means whereby the Government hoped to

¹⁴ Yoshinosuke Yagi, *The problem of farm debt adjustment*, Kyoto University Economic Review, p. 65. July 1937.

¹⁵ *Ibid.*

scale down the farm debts were reduced to nothing else than "making a more active use of the tradition of neighbourly fellowship and mutual aid."¹⁶

The basic features of the Debt Adjusting Act offered no solution for the debt problem. The hope that by virtue of the Act farm indebtedness would be scaled down considerably did not materialize. Between August 1, 1933, and June 30, 1936, a period of nearly 3 years, the loans extended to the associations by the Government amounted to only 15,440,000 yen, or 7.7 per cent of the 200 million yen to be distributed in the course of 5 years. On March 30, 1936, debts actually adjusted amounted to 157 million yen, 26 per cent of the minimum or 15 per cent of the maximum sum planned and only 2.6 per cent of the total estimated farm debt.

Japan's land tenure system has been the fundamental cause of the widespread discontent in the countryside. How to remove it has been a question agitating the Japanese Government for a number of years. Two measures have been adopted toward this end. One of them is the Conciliation of Tenancy Disputes Bill, enacted in 1924. It provides, first, for a more simplified court procedure, and, second, for arbitration by a committee composed of a judge and several citizens. If the parties in dispute express their satisfaction with the committee's decision, it becomes effective and is transferred to the court for a formal approval. More than half of the tenancy disputes are settled in this manner.

The second measure aims to do away with tenancy as an institution, by assisting the tenants to become independent farm owners. A program was worked out in 1926, providing for the expenditure of 468 million yen in the forthcoming 25 years. This fund was not adequate to carry on land purchases on a large scale, for at prevailing prices, a total of 287,000 acres could be acquired, or only 4 per cent of the entire arable area rented by tenants.¹⁷ To speed up the process, in 1932 a more ambitious plan was proposed in the form of a Peasants' Proprietors' Agricultural Land Bill. It provided for the

¹⁶ Ibid.

¹⁷ S. Kawada, *The establishment and maintenance of peasant farms*, Kyoto University Economic Review, p. 77. July 1928.

purchase of 1,543,000 acres over a period of 35 years and at a total cost of 2.8 billion yen. The tenants were expected to repay this sum in annual installments.

The bill provoked a great deal of criticism on the ground that it was "a device invented to enable landowners to dispose of land that was a burden to them."¹⁸ It failed to pass and there remains in operation only the plan inaugurated in 1926. In 8 years, 1926-1933, nearly 120,000 tenants were assisted in the purchase of 126,000 acres, or less than 2 per cent of the entire volume of rented land. The conclusion of a Japanese student of the country's land tenure system is that "the present plan is thus quite ineffectual as a measure for solving the land problem."¹⁹

In addition to the outlined plans, a number of unsuccessful attempts have been made to enact a law that would stabilize landlord-tenant relations. In view of Japanese tenure relations conditions, any tenancy law involves a downward revision of rents and an acknowledgment of the tenant's right to the land. Landlords see in this an infringement on their rights and they fight bitterly, and so far successfully, against any change.

Considerable importance has been attached in the past 6 years to the problem of settling Japanese farmers in Manchuria. According to Japan's Secretary of Agriculture, "Japanese emigration to that vast land means, *inter alia*, the extension of the rural community which forms the backbone of the Japanese race, a way out of the difficulties arising from the intensive system of cultivation in Japan Proper and the exploitation of natural resources in that latter country."²⁰ More concretely, Manchuria was to take the place of a safety valve, as it were, for relieving the pressure on land in Japan.

For the time being the accomplishments bear little relation to the outlined plan; nor do they augur well for the widely entertained idea in Japan that Manchuria is becoming an important outlet for the Japanese surplus farmers. During

¹⁸ Y. Yogi The current land problem and the establishment of peasant proprietorship, Kyoto University Economic Review, p. 73. December 1936.

¹⁹ Ibid.

²⁰ Yoriyasu Arima, Japan's agricultural administration, Contemporary Japan, p. 181. September 1937.

the years 1932-1937 a total of only 2,785 families, subsidized by the Government to the extent of 1,000 yen per family, found their way to Manchuria. But the Japanese Government refused to be dismayed by this result and in 1937 it drew up a vastly more ambitious program. The latest move calls for the resettlement into Manchuria of a million farm households of 5 million people, in the course of the following 20 years.

The brighter side of Japan's agricultural economy is in the widespread development of the cooperative movement. It has been sponsored and financially aided by the Japanese Government. The savings effected through the reduction of the great number of intermediate merchants, for instance, is one of the factors stressed in favor of the movement. Farmers represent 70 per cent of the total membership of about 6 million. The main functions of the Japanese cooperative societies are confined to providing credit, making sales and purchases, and the joint utilization of warehouses, milling establishments, farm machinery, and workshops. Almost half of the cooperatives combine all the mentioned activities.

The movement has been playing an increasingly important role in Japan's farm economy. Within the period 1920-1934 sales of rice through cooperatives increased ninefold. The same is true of wheat and to a lesser extent of cocoons. In the latter year, 28 per cent of all the marketed rice, 27 per cent of the wheat and 12 per cent of the cocoons were sold through the cooperatives. Considerable progress has been registered by the cooperative purchasing societies. Their main efforts are concentrated in the purchase of fertilizers, and in 1934 they handled one-third of the total consumption.

The cooperative credit societies extend loans for productive purposes such as purchases of land and agricultural machinery. Until recently about 70 per cent of the loans were granted without security, but on the basis of a minute examination of the moral, financial and political standing of the borrower. Of late there has been a reversal of this policy; the tendency is to grant loans only against some tangible form of property. The rate of interest is rather high, ranging as it does from 8 to 12 per cent per annum. There is little difference between these rates and those charged by com-

mercial banks but in certain cases the former are even higher. They generally do not relieve the rural population from the necessity of securing loans from private individuals at usurious rates. This is especially true in the case of the poorer peasants, because "in practice . . . credit societies are said to be made up of middle- and upper-class membership."²¹ In the light of these facts, it becomes apparent why rural indebtedness to the cooperative credit societies comprises only from 10 to 15 per cent of the total farm debt.

The cooperative movement has, on the whole, benefited Japan's agricultural economy, but the benefits are not evenly distributed. The more prosperous sections have profited most. Present plans for increasing the importance of the cooperative movement in the Japanese village might not be without its positive effects on the well-being of the least prosperous group. But the widely held view, particularly in official circles, that the very solution of Japanese agricultural problems is closely tied up with the cooperative movement is exaggerated; it can alleviate certain burdens but is in no position to remove them altogether.

The war waged by Japan against China is no boon for Japanese agriculture. The demand for farm products has been stimulated, but many farmers, having no surpluses to throw on the market, have not been able to reap the benefits of higher prices. Moreover, it is stated that the movement in prices of agricultural products have not kept pace with the rise in prices of articles which are essential to the farmers; while quotations of agricultural products have recently advanced, they are far below those of articles commonly purchased by the rural population.²² In addition, the war deprived many farms of their principal workers, absorbed considerable numbers of livestock, and utilized so much fertilizer that the farmers have been having difficulty in obtaining a sufficient volume for their own use.

Various measures have been adopted since the outbreak of the Sino-Japanese war to assist the rural sections of the country. Chief among them are the Farm Adjustment Law and the Temporary Farm Debts Liquidation Law, both of which were enacted on April 2, 1938.

²¹ *Ibid.*, p. 123.

²² Monthly Circular of Mitsubishi Economic Research Bureau, p. 8. June 1938.

The first one is related to the creation and maintenance of new farm proprietors, the adjustment of tenant-landlord relations, and the disposition of farms owned by farmers who have been conscripted into the army. Perhaps the outstanding provision of the Law is the strengthening of the position of the tenant with respect to leases. The landlord cannot evict a tenant unless sufficient reason, as indicated in the Act, is given. The effectiveness or lack of effectiveness of the measure cannot be determined at this juncture; it should be stressed in this connection that, on the whole, the provisions of the Act are rather vague and that the landlords still have an important voice in rural matters, particularly where their own interests are involved.

The Debt Liquidation Law does not extend to the farming population as a whole but only to "bereaved families and families of wounded soldiers living in the countryside."²³ Under the provision of the Law the Temporary Prefectural Committee for the Liquidation of Debts mediates between the debtor and creditor concerning the reduction of the principal, rate of interest, or period of redemption. The funds required to effect debt adjustment are to be supplied by a number of government banks, but in all such cases "the amount of this special financing by those banks shall be within the estimated value of the real property given in mortgage."²⁴ The liability of the Government for any losses incurred in the process of this financing is limited to 120 million yen.²⁵ This latest attempt to deal with rural indebtedness differs little from that of 1933; the farmers are asked once again to ease the debt burden through the employment of their own meager resources. This method was not successful in the past, and it holds little promise for the present or the future.

Conclusion

The urgent need of putting Japan's agricultural economy in order has been recognized now by those who shape the country's development. The former Minister of War, General Araki, stated that "if we should succeed in solving the

²³ *Ibid.*, p. 18.

²⁴ Farm debts redemption fund law, Art. 3. Monthly Circular, Mitsubishi Economic Research Bureau, September 1932.

²⁵ *Ibid.*, Articles 5, 6 and 8.

agrarian problem, it would be easier to solve the remaining serious social problems."²⁶ But despite such expressions of grave concern, the measures enacted to aid agriculture were not sufficient to accomplish the task at hand.

To be sure, the task is a tremendous one and, under the present circumstances, some of its aspects hardly lend themselves to a solution. Assuming that Japan's farming area could be expanded by 3.5 million acres,²⁷ and that it would be economically advisable to do so, the total crop area would reach 18.5 million acres, or an average of 0.7 acres per capita. According to Japanese students of the problem this would be 0.5 acre short of the minimum requirement. Only exceedingly rapid industrialization or large-scale overseas migration could achieve this minimum standard. It is reasonably certain, however, that for years to come neither development is likely to take place, and the fundamental problem created by a great pressure of population on a very limited land area will undoubtedly continue to hamper the country's rural progress.

Notwithstanding the restrictions imposed by the problem of "many men on little land," the plight of the Japanese farmer can be alleviated to some extent by scaling down indebtedness, lowering interest rates, improving credit facilities, levying more equitable taxation, and by making a serious attempt to eradicate the evils of the existing tenancy system. All these things cannot be achieved by self-help, spiritual regeneration, and the oft-repeated statement that the farmers are the mainstay and backbone of the nation. Improvement of rural conditions can hardly be attained now without subsidizing the subsidizers—as the Japanese farmers may be truly called.

This is a line of action that requires large financial outlays, which the farmers are manifestly in no position to supply. Moreover, the ever-mounting expenditures in consequence of Japan's war against China leaves little, if anything, for rural reconstruction. It is likely, however, that at some future

²⁶ Contemporary Japan (Collections of Essays in Russian) p. 73. Moscow, 1934.

²⁷ Shiroshi Nasu, Population and food supply in Japan, in Problems of Pacific. Proceedings of Second Conference Institute of Pacific Relations, p. 343. Honolulu, 1927.

date the very policy of expansion which involves the use of the army may give the demand of the farmers a friendlier reception. To the army, "the agricultural population constitutes Japan's first line of defense"; consequently, that line must be strengthened. Since stop-gap measures have proved inadequate, a thorough treatment of the country's number-one problem may yet become the order of the day. Meanwhile, all one can do is to register the fact that, although talk about agricultural reform has become a favorite pastime of the leading political parties of the country, the farmers are still struggling against heavy odds, which they cannot overcome singlehanded.

THE EQUILIBRIUM METHOD OF TARIFF ANALYSIS APPLIED TO EGYPTIAN UPPERS COTTON

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THE equilibrium method of tariff analysis¹ has not, to date, been frequently used in the analysis of actual tariff problems. Though there has been some disagreement concerning the theory and simplifying assumptions underlying the method, it is believed that its failure to be more widely used has been principally due to two other reasons. In the first place, the mathematical statement of the method, that is, the equilibrium formula, has been a barrier to the understanding and use of the method by economists who have not had mathematical training. Even the graphic form of the method presented by Henry Schultz¹ leaves an initial impression of great complexity. The second and much more important reason has been the difficulty of estimating, with sufficient accuracy, the four elasticities required; namely, the elasticity of the domestic demand curve, the elasticity of the foreign demand curve, the elasticity of the domestic supply curve, and the elasticity of the foreign supply curve. These elasticities must be estimated in order that these curves may be drawn, and it is these four curves which, in the equilibrium method, determine the price and quantity incidence of any change in a duty if there is no important substitute for the product.

In order to promote a wider understanding of the mechanics of the method, the first section of this paper presents a simplified graphic equilibrium method of determining the incidence of a duty when it is assumed that the demand and supply curves required are known. The duty on long staple cotton as it affects Egyptian Uppers cotton is used

¹ An explanation of the equilibrium method of analyzing the effects of a duty is given in an article by Henry Schultz, *Correct and incorrect methods of determining the effectiveness of the tariff*, *Journal of Farm Economics*, 17 (4), 1935. Mr. Schultz credits the method to A. C. Pigou, *The known and the unknown in Mr. Chamberlain's policy*, *Fortnightly Review*, January, 1904. Mr. Jacob Viner in *Studies in the theory of the international trade*, 1937, page 589 and footnote 15, page 591, states that the equilibrium formula is essentially an algebraic application of a graphical analysis of the incidence of a duty developed by Cunyngnam in 1904.

as an illustration. This graphic method is simpler than the graphic methods presented by Henry Schultz, since it does not involve the use of any curves derived from the original demand and supply curves for the product. While the elimination of these derived curves makes the actual process of determining the incidence more cumbersome than the graphic process described by Henry Schultz, the advantages are that it is easier to understand and that it emphasizes certain aspects of the equilibrium method which need emphasis: namely, that all effects of a change in a duty are determined by the basic curves existing at the time the duty is changed; that all curves derived from these are merely labor-saving devices and are not necessary to the use of the equilibrium method; and that none of the basic curves are shifted by the change in the duty, unless a substitute for the dutiable article is present in one or both of the markets.

The remainder of the paper deals with the more important limitation on the usefulness of the equilibrium method; namely, the difficulty of estimating the elasticities. The approach to this problem is not that of developing better methods of deriving demand and supply curves from time series. On the contrary, the approach is that of developing a formula which, in the special case to which it applies, will give a usable limit on the price incidence of a tariff without requiring the estimation of any of the actual elasticities involved.

Using the domestic price incidence of the removal of a 7-cent duty as an illustration, a "usable lower limit" on that incidence might be a finding that the removal of the duty would lower the price in the duty-changing country more than some figure close to the full amount of the change in the duty, for instance, 6.5 cents. Just how close to the full change in the duty such a lower limit has to be in order to be "usable" will naturally depend upon the use to which the information is to be put. There are probably situations in which it would be useful to know that the fall in the domestic price would be at least 4 cents out of the 7 cents. But as used in this paper a "usable limit" is thought of as one which leaves a range for variation in the price incidence of less than 20 per cent of the duty. There may also be usable upper limits

on the price incidence of a duty. For instance, a finding that the removal of the 7-cent duty would not lower the price in the duty-changing country more than one-half cent would be a usable upper limit on the domestic price incidence of the 7-cent duty.

In this paper a formula for a lower limit on the domestic price incidence of a duty is developed for only one type of special case. It is believed, however, that further work with the equilibrium method will uncover many other special cases for which formulas may be developed, which will yield usable limits on the price and quantity incidence of the duty without the necessity for estimating any of the actual elasticities. It is believed that the development of these special-case formulas will, in the future, greatly increase the application of the equilibrium method to actual tariff problems.

*A Simplified Graphic Equilibrium Method of Determining
the Price Incidence of a Duty, Assuming the
Demand and Supply Curves are Known*

An analysis of the effect of the 7 cents per pound duty on long staple cotton (cotton having a staple length of one and one-eighth inches or longer) on the price of imported Egyptian Uppers cotton during the seven years beginning August 1, 1930² gave rise to the average prices and quantities used in figure 1 and also to the estimated demand and supply curves used in that figure. No United States supply curve for Egyptian Uppers cotton is shown in figure 1 because no cotton having all the characteristics of the imported cotton is produced in the United States. American long staple Upland cotton is on an export basis. This and other facts indicate that the American long staple cotton competes with Egyptian Uppers, both here and abroad as a substitute, rather than as the same product (see ¶ beginning bottom p. 648). The procedure is, therefore, to use only the demand and supply curves for Egyptian Uppers cotton in arriving at a first approximation of the incidence of the duty and later (see pages 649-650) to show that, in the case of Egyptian Uppers, if

² This analysis appears as an appendix to a report entitled: The tariff on long staple cotton and its effects, by C. F. Wells and Maurice R. Cooper, issued in mimeographed form by the United States Department of Agriculture, Bureau of Agricultural Economics in July 1938.

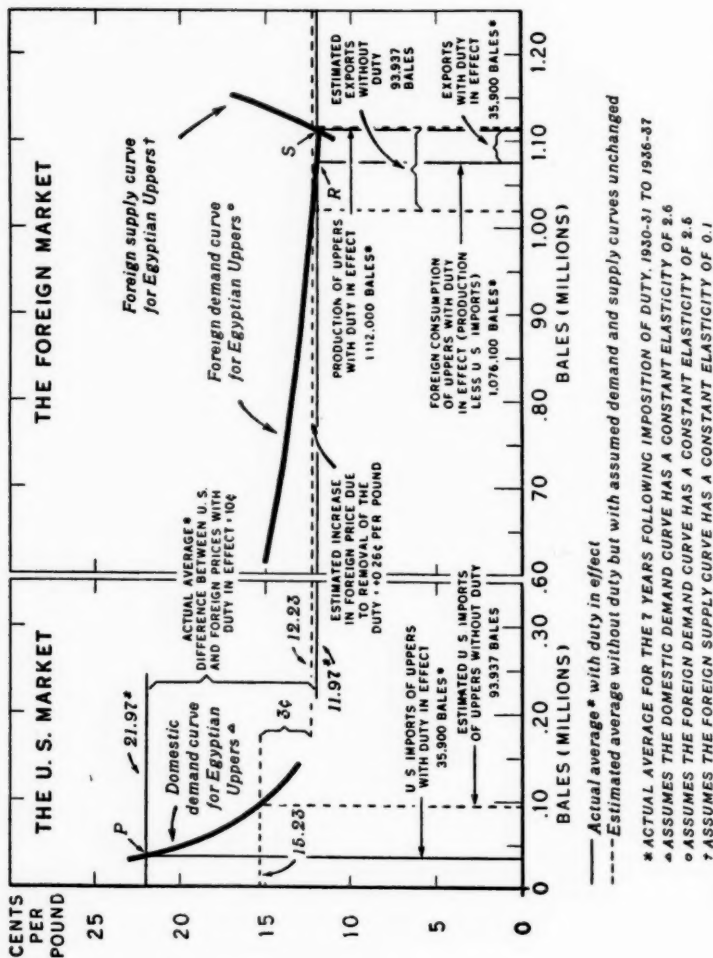
the effect of the substitute cotton could be allowed for, the domestic price incidence would be greater than that indicated by this first approximation.

In figure 1 the actual average post-duty prices of Egyptian Uppers cotton and the quantities produced, consumed, and imported, in both the United States and the foreign market, are shown by the solid price and quantity lines as being in "equilibrium" with the duty in effect, and the broken price and quantity lines indicate a new "equilibrium" situation for the same period but without the duty in effect, hereafter referred to as the "without duty" equilibrium.

For the prices of Uppers in the United States and foreign markets to be in equilibrium when any set of supply and demand curves is given, if the United States is importing the product, the prices in the two markets must meet both of the following requirements:

1. The prices in the two markets must differ by the amount of the duty, if any, plus freight and any other non-duty costs of importation. It is obvious that this must be true if Uppers continue to be imported, since the importers would not continue to bring this cotton in and sell it at less than their total cost laid down duty paid in this country. This assumption gives rise to the concept of "equivalent prices" which is used in the following discussion. With any given duty-paid price in this country, say 22 cents per pound, the "equivalent" foreign price in any given foreign market would be 22 cents less our duty and less all non-duty costs of importation. It is also assumed in this connection that a change in the duty will not change non-duty costs of importation where imports continue.
2. The prices must intersect the demand and supply curves at a level at which the quantity the United States will be willing to import just equals the quantity the foreign market is willing to export to the United States.

Owing to the fact that there is no United States production of Egyptian Uppers or of exactly similar cotton, and owing to the omission of carry-over from the calculations because of the lack of information concerning foreign carry-over, domestic consumption of imported cotton for the 7-year period is assumed to be equal to imports, and the United States demand curve is, therefore, supposed to represent the



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FIG. 1. Average Estimated Effect of Removing the 7-cent Duty on Price of Egyptian Uppers Cotton in New England and Alexandria, Egypt, for the 7 Years since Imposition of the Duty.

relationship between price and imports as well as between price and consumption. In the foreign market the lack of carry-over data necessitates the use of production figures to represent supply, and the supply curve is, therefore, assumed to represent the relationship between price and production, rather than between price and supply available for sale or carry-over. Finally, foreign consumption is estimated by deducting United States imports from foreign production, and the foreign demand curve is, therefore, supposed to represent the relation between the foreign price and foreign consumption thus estimated. Under these assumptions the second requirement is equivalent to saying that the United States price line must intersect the domestic demand curve at a level at which imports will equal the difference between the foreign consumption and the foreign production as set by the intersection of the equivalent foreign price line with the foreign demand and supply curves.

An examination of the solid price lines in figure 1, representing the equilibrium condition with the duty in effect, will show that these price lines have been drawn at levels at which they fulfill both of the above requirements. With respect to the first requirement, it will be seen that the foreign price averaged 10 cents per pound lower than the domestic price (11.97 cents as compared with 21.97 cents) which spread is greater than the 7-cent duty by about 3 cents, the approximate average spread between the New England price and the Alexandria price during several year prior to the enactment of the duty in June 1930.

As to the second requirement, it will be seen that the domestic price line at 21.97 cents intersects the domestic demand curve at 35,900 bales on the scale representing United States imports. The equivalent foreign price line at 11.97 cents cuts the foreign demand curve at a consumption of 1,076,100 bales and the foreign supply curve at a production of 1,112,000 bales on the quantity scale in the foreign market. Thus, at a foreign price of 11.97 cents, foreign countries were willing to export the difference between what they were willing to consume at a price of 11.97 cents (or 1,076,100 bales) and what they were willing to produce at that price (or 1,112,000 bales) a difference of 35,900 bales.

At the corresponding domestic price of 21.97 cents the United States was willing to import the 35,900 bales. Thus, the solid lines in figure 1 represent an equilibrium condition with the duty in effect.

With the demand and supply curves shown, if both the United States and foreign prices had been higher than those shown by the solid price lines in figure 1, the United States consumers would have been unwilling to import as much as would have been available for export to the United States in the foreign market. If both prices had been lower than the solid price lines shown in figure 1, the opposite type of disequilibrium would have existed.

Turning next to the determination of the "without duty" equilibrium prices, it would seem that the removal of the duty should not, in itself, cause much change in non-duty costs of importation. Furthermore, it would seem reasonable to assume that competitive forces would reduce the intermarket price spread by an amount about equal to any reduction in the total costs of importation that would result from the reduction in the duty. These assumptions would lead to the expectation that after the removal of the 7-cent duty the intermarket price spread should decrease by about the amount of the duty or until it equaled remaining costs of importation, or 3 cents. Assuming that after the removal of the duty the intermarket price spread would be 3 cents, the next question is the determination of the absolute level of the price in each market in the absence of a duty. A graphic trial-and-error method of finding these without-duty equilibrium prices consists of moving the broken price lines in both markets up or down the curves in figure 1, always keeping the intermarket price spread constant at 3 cents until a level is reached at which their intersections with the curves equate the United States demand for imports to the foreign supply of United States imports at the new prices. In other words, the broken price lines in the two markets with a 3-cent spread are shifted up or down until they intersect each of the three curves at points at which the quantity on the scale representing United States imports equals the difference between foreign production and foreign consumption on the base scale in the foreign market. It will be noted

that the broken price lines in figure 1 meet this second requirement for a new equilibrium at a new United States price of 15.23 cents, and at a new foreign price of 12.23 cents.

The "without-duty" foreign price of 12.23 cents per pound is only 0.26 cents per pound higher than the "with-duty" foreign price of 11.97 cents per pound. In other words, with the demand and supply curves used in figure 1 and under the assumption that the removal of the duty would not change the positions of the curves themselves, the removal of the duty would have had very little tendency to raise the foreign price of Uppers.

The results in this first case were obtained by using constant elasticity curves instead of straight line curves. In order to test the importance of this decision, the price incidence has been recalculated in case 2, using straight line curves. A comparison of the results in case 2 with those in case 1 will show that about the same results are obtained under either method in the case of Egyptian Uppers.

Case number	Type of curves used	Elasticities used ¹			Results of removing the 7-cent duty					
		Domestic demand	Foreign demand	Foreign supply	U. S. Price			Foreign Price		
					With duty	Without duty	Incidence	With duty	Without duty	Incidence
1	constant elasticity	-2.6	-2.5	0.1	21.97	15.23	-6.74	11.97	12.23	+0.26
2	straight line ²	-2.6	-2.5	0.1	21.97	15.09	-6.88	11.97	12.09	+0.12

¹ There is no domestic production, and, therefore, the elasticity of the domestic supply is known to be zero in both cases.

² The elasticity of the domestic demand applies only at point P, that of foreign demand at point R, and that of foreign supply at point S in figure 1, since the schedules are straight lines in case 2.

In the following section, material will be presented which will permit the reader to form an opinion concerning the reliability of these results in the case of Egyptian Uppers. The formulas used in the next section are derived from Henry Schultz's formula which assumes straight line demand and supply curves. Therefore, the findings in the next section will be directly comparable to case 2 results rather than to

case 1 results. Since, however, case 2 indicates about the same price incidence as case 1, it follows that the findings of the following section are almost as applicable to case 1 as to case 2 results.

*A Special Case Formula for Estimating a Lower Limit
on the Price Incidence of a Duty*

The usual exposition of the equilibrium method of determining the effects of a duty on a single commodity, describes the simplest possible case, namely, one in which there are assumed to be only two countries or markets, the duty-changing country, and all other combined and treated as a single foreign country or market. It is also usually assumed that there is no important imperfect competitor or substitute for the commodity in either market. It is also assumed that there is competition among buyers, that there is an inverse relationship between price changes and resulting changes in consumption, and that there is competition among producers and a positive relationship between price changes and resulting changes in production. In order to facilitate the mathematical calculations, it is also usually assumed that the demand and supply curves involved are straight lines on arithmetic grids within the range likely to be involved in any given tariff change. It is also usually assumed that the product is being imported by the duty-changing country and that a change in the duty will not stop imports. It is also assumed that, if the duty-changing country is importing the product, the price in that country will exceed the price in the foreign country of origin by the exact amount of any duty in effect, plus all non-duty costs of importation, and that a change in the duty will not change the latter. Finally, at equilibrium, the quantity of imports demanded by the duty-laying country must equal the quantity of exports supplied by the "foreign" country. All of these assumptions appear to be reasonable as applied to agricultural products except that in many cases agricultural products have substitutes.

Under these assumptions the incidence of a change in a duty on the domestic price is determined by the following

formula which is equivalent to Schultz's formula (8)³ and which uses the same notation:

$$(1) \quad \Delta y_d = \frac{y_d(\eta_f x_{df} - e_f x_{sf})}{y_d(\eta_f x_{df} - e_f x_{sf}) + y_f(\eta_d x_{dd} - e_d x_{sd})} \Delta T.$$

In this formula ΔT is the change in the duty, and Δy_d is the resulting change in the price in the duty-changing country, or, in other words, the domestic price incidence of the change in the duty. The ten mathematical quantities in the fraction may be defined as follows:

y_d = the equilibrium price in the duty-changing country (domestic market).

y_f = the equilibrium price in a representative market in any foreign country from which the product is being imported.

x_{dd} = the equilibrium quantity of the product demanded in the duty-changing country. This is the combined quantity demanded of both the domestically produced and imported portions of the supply, if the product is produced in the duty-changing country, as well as being imported.

x_{df} = the equilibrium quantity of the product demanded in all foreign countries combined.

x_{sd} = the equilibrium quantity supplied in the domestic market from domestic sources.

x_{sf} = the equilibrium quantity supplied to all markets from foreign sources.

η_d = the elasticity of the domestic demand curve at the point of equilibrium determined by y_d and x_{dd} . This is assumed to be negative.

η_f = the elasticity of the foreign demand curve at the point of equilibrium set by y_f and x_{df} . This is assumed to be negative.

e_d = the elasticity of the domestic supply curve at the point of equilibrium set by y_d and x_{sd} . If not equal to zero, this is assumed to be positive.

³ This formula is equivalent to Schultz's formula (8) given in the article referred to in footnote 1. It differs from Schultz's formula (9) in that the latter abstracts from freight and other non-duty costs of importation, whereas the above formula does not.

e_f = the elasticity of the foreign supply curve at the point of equilibrium set by y_f and x_{sf} . If not equal to zero, this is assumed to be positive.

Since it is reasonable to assume that market prices and quantities approximate equilibrium prices and quantities and since market prices and quantities are usually available, it follows that the six equilibrium prices and quantities (the y and x values) are obtainable or known quantities and only the four elasticities are unobtainable or difficult to estimate with sufficient accuracy.

Though the formula for a lower limit on the domestic price incidence of a duty which is presented below does not require the estimation of any of the four elasticities it does involve making an estimate of the maximum value which the following demand elasticity ratio could reasonably be expected to have in any case to which the formula may be applied

$$\frac{\text{Elasticity of the domestic demand}}{\text{Elasticity of the foreign demand}} = \frac{\eta_d}{\eta_f}.$$

Where nothing at all concerning the relative elasticity of demand in the two markets is known it is submitted that the best guess is that the elasticity of demand is the same in both markets and that the true value of the ratio is therefore unity. This is because both demand elasticities apply to the same product. Lacking information to the contrary, the presumption is that the product is used in both markets in about the same way, by about the same class of consumers, and competes with about the same substitutes. Though unity may be the most probable value of the ratio in such cases, what is needed is a value of the ratio high enough so that the chances are very small that its true value, if that could be determined, would exceed it. The estimate of this maximum value of the demand elasticity ratio is the only estimate concerning the elasticities that remains to be made in the special case to which the following formula is applicable and this may be contrasted with the necessity of estimating all four of the actual elasticities when using the general equilibrium formula. The larger the maximum value assigned to the demand elasticity ratio, however, the lower will be the lower

limit on the price incidence that will be obtained by use of the formula and therefore the wider the range within which the incidence may vary.

Having decided upon some maximum value for the demand elasticity ratio on the basis of a study of the commodity the formula developed in this paper will give the lowest price incidence that is possible *with that value of the demand elasticity ratio* and with the known prices and quantities involved.

Letting $\Delta'y_d$ represent the change in the price in the duty-changing country which would result from a change in the duty in the special case which meets all three of the requirements outlined below, if it is estimated that the value of the demand elasticity ratio, η_d/η_f , is equal to or less than unity, then it can be proven⁴ that $\Delta'y_d$ cannot be less than $\Delta''y_d$ as defined in formula (3).

$$(3) \quad \Delta''y_d = \frac{1}{1 + \frac{y_f}{y_d} \frac{x_{dd}}{x_{df}}} \Delta T.$$

⁴ In the special case it is known that there is no domestic production of an article identical with the dutiable article and therefore it is known that $e_d=0$ and $x_{dd}=0$. These terms therefore vanish from formula (1) which then becomes:

$$\Delta'y_d = \frac{y_d(\eta_f x_{df} - e_f x_{sf})}{y_d(\eta_f x_{df} - e_f x_{sf}) + y_f \eta_d x_{dd}} \Delta T$$

which, after dividing both the numerator and the denominator of the fraction by its numerator, becomes:

$$(2) \quad \Delta'y_d = \frac{1}{1 + \frac{y_f \eta_d x_{dd}}{y_d(\eta_f x_{df} - e_f x_{sf})}} \Delta T = \frac{1}{1 + \frac{y_f}{y_d} A} \Delta T, \text{ where } A = \frac{\eta_d x_{dd}}{(\eta_f x_{df} - e_f x_{sf})}.$$

$\Delta''y_d$ is defined as follows:

$$(3) \quad \Delta''y_d = \frac{1}{1 + \frac{y_f}{y_d} \frac{x_{dd}}{x_{df}}} \Delta T = \frac{1}{1 + \frac{y_f}{y_d} B} \Delta T \text{ where } B = \frac{x_{dd}}{x_{df}}.$$

$\Delta'''y_d$ is defined as follows:

$$(4) \quad \Delta'''y_d = \frac{1}{1 + \frac{\eta_d}{\eta_f} \frac{y_f}{y_d} \frac{x_{dd}}{x_{df}}} \Delta T = \frac{1}{1 + \frac{y_f}{y_d} C} \Delta T, \text{ where } C = \frac{\eta_d x_{dd}}{\eta_f x_{df}}.$$

Formula (4) is used only when the value of η_d/η_f is greater than unity.

Proof of the proposition that when the value of η_d/η_f is not greater than 1, the value of $\Delta'y_d$ is never less than that of $\Delta''y_d$ is divided into two parts, first when $e_f=0$ and second when e_f is greater than zero.

Egyptian Uppers fulfills all three requirements of the special case listed below. The analysis of Egyptian Uppers which was referred to in footnote 2 led to the conclusion that the foreign demand was probably more elastic than the domestic demand. This would mean that the value of the demand elasticity ratio η_d/η_f was not greater than 1. Inserting in formula (3) the with-duty prices and quantities consumed from figure 1 we have:

$$(3) \quad \Delta''y_d = \frac{1}{1 + \frac{11.97 \times 35,900}{21.97 \times 1,076,100}} (-7) = -6.88 \text{ cents.}$$

That is, if we could be sure that in the case of Egyptian Uppers the value of η_d/η_f did not exceed 1 then it would follow that the removal of the 7-cent duty could not lower the United States price of Uppers *less than* 6.88 cents per pound, regardless of the actual values of the three elasticities, η_d , η_f , e_f . Since the fall in the domestic price could not

When $e_f=0$ then A in (2) or

$$\frac{\eta_d x_{dd}}{(\eta_f x_{df} - e_f x_{df})}$$

becomes equal to C in (4), or

$$\frac{\eta_d x_{dd}}{\eta_f x_{df}}.$$

But when η_d/η_f is not greater than 1 then C in (4) is not greater than B in (3) or x_{dd}/x_{df} .

Therefore when $e_f=0$ and η_d/η_f is not greater than unity, $A=C$ which is not greater than B . Therefore A in (2) is not greater than B in (3) and the value of $\Delta'y_d$ is not less than $\Delta''y_d$.

On the other hand, when e_f is not zero it must be a positive quantity because it is assumed that supply curves have a positive slope. Since demand curves have negative slopes the demand elasticities are negative quantities. Therefore when e_f is greater than zero the denominator of A or $(\eta_f x_{df} - e_f x_{df})$ is larger than the denominator of C in (4) or $\eta_f x_{df}$. Since A and C have the same numerator it follows that A is less than C . Since C is again not greater than B it follows that A is less than B and therefore $\Delta'y_d$ is greater than $\Delta''y_d$ when e_f is a positive quantity and when the value of η_d/η_f is not greater than 1.

Proof that the value of $\Delta'y_d$ cannot be less than the value of $\Delta'''y_d$, the latter being a lower limit on $\Delta'y_d$ which assumes that the value of η_d/η_f is greater than 1, follows from what has been shown above. It follows from the above that when $e_f=0$, A in (2) equals C in (4) *regardless* of the value of η_d/η_f and that when the value of e_f is greater than zero, the value of A is less than C *regardless* of the value of η_d/η_f . Therefore, regardless of the value of η_d/η_f and of e_f , A is never greater than C and $\Delta'y_d$ is never less than $\Delta'''y_d$. The limits $\Delta''y_d$ and $\Delta'''y_d$ apply to a wider range of cases than the limit which was presented in a note by C. F. Wells and A. Mason DuPré, Jr., entitled, "A special case consumption-ratio formula for the determination of a limit on the price incidence of a duty," which appeared in the November 1938 issue of the *Journal of Farm Economics*. The proofs of the limits presented here were suggested by the proof of the consumption-ratio formula.

have been greater than 7 cents, the use of $\Delta''y_d$ as a lower limit would yield a useful result in the case of Egyptian Uppers, if we could be sure that the value of the demand elasticity ratio was not greater than 1.

In formula (3) the fraction

$$\frac{y_f}{y_d} \frac{x_{dd}}{x_{df}}$$

may be called the price and consumption ratio. It is clear that the *smaller* the price and consumption ratio the *higher* the value of $\Delta''y_d$. That is, the smaller the consumption in the duty changing country compared to consumption in all other countries, and the smaller the foreign price compared to the domestic price, the higher the lower limit on the domestic price incidence that will be obtained with any given value of the demand elasticity ratio.

On the other hand, if the product meets all three of the requirements described below, but it is decided that the value of the demand elasticity ratio exceeds unity but does not exceed some estimated maximum value, W , then the demand elasticity ratio may be assigned this limiting value W and this value may be placed in (4) together with the known price and consumption ratio and solved for $\Delta'''y_d$. It can be proven (see footnote 4) that $\Delta'''y_d$ is a lower limit on $\Delta'y_d$ the domestic price incidence in the special case when the value of η_d/η_f is greater than unity.

$$(4) \quad \Delta'''y_d = \frac{1}{1 + \frac{\eta_d}{\eta_f} \frac{y_f}{y_d} \frac{x_{dd}}{x_{df}}} \Delta T.$$

Formula (3) will, of course, always give a higher, and therefore more desirable, lower limit on the domestic price incidence than formula (4). That is, $\Delta'''y_d$ is always higher than $\Delta''y_d$ but the former can only be used when it is reasonably certain that η_d/η_f is not greater than 1.

If it were assumed that the value of the demand elasticity ratio in the case of Egyptian Uppers were greater than 1 but not greater than 5 then inserting 5 in formula (4) together with the price and consumption ratio values used in the previous case would give the following result:

$$(4) \quad \Delta'''y_a = \frac{1}{1 + 5 \frac{11.97 \times 35,900}{21.97 \times 1,076,100}} (-7) = -6.42 \text{ cents.}$$

This means that, if it could be assumed that the true value of η_a/η_f is not greater than 5, then the fall in the domestic price $\Delta'y_a$ that would follow the removal of the 7-cent duty would *not be less than* 6.42 cents regardless of the actual values of the three elasticities, η_a , η_f , and e_f . In the case of Egyptian Uppers there is no known reason for believing that the value of the demand elasticity ratio might exceed 5. But in order to show how uncritical the value of this ratio is in the case of Egyptian Uppers the value of $\Delta'''y_a$ was calculated assuming a maximum value of 10 for the ratio. The value of $\Delta'''y_a$ in this case was -5.92 cents. Even as small a lower limit on the domestic price incidence of the 7-cent duty as 5.92 is still high enough to be useful for many purposes where a high degree of accuracy is not required.

The role of the price and consumption ratio as one of the factors contributing to these results for Egyptian Uppers needs emphasis. In the first place this ratio, all quantities in which are obtainable from market statistics, is present both in formula (3) and in formula (4). The value of this ratio is very low in the case of Egyptian Uppers cotton (0.018) principally because of the relatively small size of the United States market for Egyptian Uppers. In the period used, the United States average consumption of Egyptian Uppers (x_{da}) was only 35,900 bales while the average foreign consumption (x_{df}) was 1,076,100 bales. In other words, the consumption in the duty-changing country was only 1/30 or about 3.3 per cent of consumption in the rest of the world. It is reasonable to expect that more or less regardless of differences in the elasticities, the price effect in the small market of a change in the duty will be greater than in the large market. The fact that the duty was a large percentage of the foreign price (y_f) thus causing that price to be only 55 per cent of the United States price (y_a) was a less important factor contributing to the results.

In the case of Egyptian Uppers the value of the price and consumption ratio is so low that the decision as to the value

of the demand elasticity ratio is uncritical within any range which would be at all reasonable. This is shown by the fact that in the case of Egyptian Uppers changing the value of η_a/η_f from less than unity to 10 only changed the indicated lower limit on the domestic price incidence from -6.88 cents to -5.92 cents or from 98.3 per cent of the 7-cent duty to 84.6 per cent.

The above formula may be applied to any product:

- (1) which is being imported by the duty-changing country when the duty is changed and which continues to be imported afterwards even though at reduced volume and
- (2) which is not produced in the duty-changing country and
- (3) which either (a) has no important substitute in either the duty-changing country or in other countries, or (b) has an important substitute only in the duty-changing country or (c) has an important substitute both in the duty-changing country and in the other countries in which it is consumed if information is available which makes it possible to say that the price of the substitute in both markets would be lowered by the reduction in the duty on the dutiable article.

Only the third requirement needs further explanation. This requirement indicates that the nature of the substitute situation for the product being studied is a factor which may determine whether or not the formula can be used. The reason for this is that the formula does not allow for the effect of the presence of substitutes on the price incidence of a change in a duty.⁵ Of course, where there are no important substitutes in either market for the product on which the duty is changed, (requirement 3) (a) the lower limit on the

⁵ The effect referred to is the one discussed by Henry Schultz in his book *Theory and measurement of demand*, page 576. He says "if beef and pork are competing goods an increase in the price of either should increase the demand for the other." In other words, an increase in the price of either product shifts the demand curve for the other to the right or upwards and vice versa. Henry Schultz's formula for the incidence of a duty is written for a case in which the dutiable article has no important substitute. Therefore, his formula does not assume that a change in a duty will shift any of the original basic curves for the dutiable article from which the formula is derived. But where there is an important substitute, in one or both markets, it seems clear that since a change in the duty will change not only the price of the dutiable article but the price of its substitutes, that that change in the price of the substitutes will shift the demand curve for the dutiable article in one or both markets. It follows that since the special case formula for a limit on the domestic price incidence of a duty developed in this paper is derived from Schultz's general formula, which does not allow for such shifts, the limit yielded by the special case formula always needs a correction where substitutes are present in either or both markets.

domestic price incidence yielded by the formula can be used without correction. Crude rubber may be given as a product which would meet requirement 3) (a).

Cashew nuts may probably be used as an illustration of a product which has a substitute only in the duty changing country (requirement 3) (b). The United States imports most of the world's output of cashews and the effect of substitutes for cashews in the very small foreign market may therefore be ignored without great error. On the other hand domestic nuts and Brazil nuts probably compete more or less with cashews in the United States market. For products of this type the lower limit on the domestic price incidence obtained with the aid of the formula may be used even if it is not possible to correct that limit for the effects of the substitutes. This is because the direction of the needed correction in the limit may be assumed to be *upward* and therefore, the uncorrected limit is still a lower limit on the domestic price incidence of the duty. To say that the correction would be *upward* means, for instance, that if the formula indicated that the domestic price would fall *at least* 1.8 cents as a result of the removal of the 2-cent duty on cashews, that this 1.8 cents would be higher if allowance could be made for the effect of the presence in the domestic market of nuts competing with cashews. The reason it is probable that the correction would show that the price would fall *more* than the 1.8 cents indicated by the formula is that the formula does not allow for the shift *to the left* in the United States demand curve for cashews that would be caused by the fall in the price of competitive nuts which would result from the removal of the duty on cashews (see footnote 5).

Where a dutiable article has important substitutes in *both* the duty-changing country and in other countries the limit yielded by the formula needs a correction for this fact and it is only when this correction is upward (requirement 3) (c) that the limit can still be used. When the direction of the correction is unknown, or when it is known to be downward, the limit obtained by the formula cannot be used.

Egyptian Uppers cotton is used in this paper as an illustration of a product which meets (requirement 3) (c). American long-staple Upland cotton competes with Egyptian Uppers

cotton both in the United States and in foreign markets.⁶ Furthermore, though the two cottons are competitive they are not perfectly interchangeable in all uses and therefore they compete as imperfect substitutes rather than as the same product.⁶ The fact that there are simultaneous imports of Uppers and exports of Upland proves that the economic characteristics of the two cottons are not identical. That they *must* be treated as separate commodities for the present purpose is proven by the fact that the tariff acts as a *wedge* between the United States and foreign prices of Uppers but *cannot* act as a wedge between the United States and foreign prices of American long-staple Upland, because Upland is on an export basis. Therefore, a change in the duty on Egyptian Uppers cannot possibly raise the domestic prices of both cottons the same amount and depress the foreign prices of both cottons the same amount. The tariff, if it has any price effect at all, must either raise the price of Egyptian Uppers relative to that of American long-staple in the United States, or depress the price of the Egyptian cotton relative to that of the American cotton in the foreign market, or must result in a combination of the two types of adjustment. An examination of the prices of the two cottons will show that the imposition of the duty caused a permanent change in the spread between the prices of the two cottons in the domestic market. Therefore, the two cottons were treated as imperfect substitutes, rather than as the same commodity.

The fact that Egyptian Uppers cotton has an important substitute in *both* the United States and in foreign markets, prevents any a priori conclusion concerning the direction of the needed correction either in the results of the graphic analysis or in the lower limit yielded by the special formula. It was concluded, on the basis of another analysis, however, that the effect of imposing the duty on Egyptian Uppers and other long-staple cotton was to raise slightly the price of the competitive American long-staple cotton, both in the United States and in the foreign market.⁶ It is therefore believed that, if the duty on long-staple cotton were re-

⁶ This proposition is not demonstrated here but is supported by material presented in the report referred to in footnote 2.

moved, the result would be a slight decrease in the price of the American long-staple cotton in both markets.

Since the two cottons are competitive in certain uses, a fall in the price of American long-staple Upland in any given market would cause consumers of Egyptian Uppers in that market to buy less Egyptian Uppers at any given price than they would if the price of the American cotton had not fallen. In graphic terms this means that a decrease in the price of the American cotton in a given market would shift the demand curve for Egyptian Uppers in that market to the left. Since it is believed that the removal of the duty from imported long-staple cottons would reduce slightly the price of American long-staple Upland in *both* the United States and foreign markets, the effect of the removal of the duty would be to shift both the United States and foreign demand curves for Egyptian Uppers slightly to the left of their positions shown in figure 1.

It follows that the domestic price decline of -6.74 cents obtained by the use of the unshifted curves in figure 1 and the minimum declines of from 5.92 to 6.88 cents obtained by means of formulas (3) and (4) are all too small because neither method allows for the shift to the left in both demand curves that would have been caused by the interaction with substitutes. For these reasons, in any case similar to Egyptian Uppers, in which it is likely that the reduction in the duty would reduce the price of the substitute, the correction in the lower limit on the domestic price incidence obtained by means of formula (3) or (4) would be upward and therefore still of value if it is useably high even though the upward correction cannot be made.

The conclusion derived from the analysis in this section is that there is at least one type of special case, which is probably fairly common, in which the domestic supply elasticity is known; in which the foreign supply elasticity may be given any value; and in which the other known elements of the equilibrium formula are of such a value that the guess which must be made concerning the maximum value of the ratio (not the actual values) of the two demand elasticities may contain a very large error without causing a serious error in the limit on the price incidence which is then indicated.

NOTES

COMPARISON OF SMALL AND LARGE FARMERS UNDER PRORATION SCHEMES

California producers of fruits and vegetables have discussed "over-production" for more than half a century. It was in the middle 80's that such discussion led to the formation of the first state-wide fruit marketing organization, the California Fruit Union.

The history of the cooperative movement in California from that time to the present is replete with discussions of one sort or another of controlled marketing schemes. Innumerable membership campaigns had as one of their goals the control of from 75 to 90 per cent of the commodity involved.

At first most of these schemes involved cooperative marketing. Later, when it became evident that "Cooperative mindedness" was at a premium, control schemes took the form of "clearing houses" which most commonly sought to combine cooperative and private agencies in schemes designed to regularize the flow to market and to equalize distribution markets.¹

Such agitation for controlled marketing largely grew out of the fact that many California crops were planted in the expectation that markets would be found in the East at prices which would normally return California producers only about 25 to 35 per cent of what Eastern consumers would pay.

A simple illustration may show how a fluctuating market affects producers so situated. Suppose producers are shipping early apples to New York for which California producers get a gross price of \$1.00 per box but which the Eastern consumer buys by the "quarter's worth" at a rate which equals \$4.00 a box. Suppose now that excessive shipments reduce the price in New York by \$1.00 a box, equivalent to 25 per cent of the retail price. If such a decline is passed on to the California producer, as is ordinarily done when the relatively fixed transportation and marketing costs must first be met, the producer's price obviously goes to zero.

Each of the numerous voluntary control plans tried by California producers quickly brought into clear relief the advantageous posi-

¹ For a more detailed discussion of these clearing houses, see Kraemer, Erich and H. E. Erdman. History of cooperation in the marketing of California fresh deciduous fruits. California Agr. Exp. Sta. Bul. 557, p. 171. September 1933.

tion of the non-cooperator. This point was brought out with particular clearness in a voluntary grape control plan operated in the fall of 1932. Plans had been developed for a voluntary proration of shipments during that season, and shippers representing 85 per cent of the crop, had agreed to cooperate. The scheme worked well during the first few weeks, but operations were given up at the end of the fourth week because by that time the non-cooperating shippers who had but 15 per cent of the total tonnage were actually making 50 per cent of the shipments.

Disgust with voluntary controls led to agitation for a compulsory control scheme which might be made effective on all when a substantial majority of producers of a given crop might vote for it. This agitation led to the passage by the California Legislature in the spring of 1933 of the "California Agricultural Prorate Act."²

Throughout the earlier period much was said about "holding the umbrella" over the non-cooperators. As might have been expected, the adoption of compulsory proration schemes developed heated controversy in which the non-cooperator instead of the cooperator took the lead. In the past year much of this controversy has centered on the effect of proration on small as compared with large farmers. This particular sort of agitation by and among small farmers and laborers in opposition to the Prorate Act came as a surprise to most of the large operators and to the members of the control boards themselves, most of whom had assumed that a prorate scheme if it raised prices at all, did so equally for large and small, and that that answered the question of desirability of such a scheme.

The issue was, of course, not clear-cut. Some of the large operators were bitterly opposed to such schemes, and many small ones favored them.

As I have listened to the various arguments advanced not only by the extremists on both sides but by middle-of-the-roaders, it seems to me that the following are the main points on which large and small farmers differed:

1. The small operator contended that his operations were so small now that if his sales were curtailed, he would not have enough left to provide a living for his family.

² For a discussion of the provisions of this act as enacted in the spring of 1933, see Erdman, H. E. The California Agricultural Prorate Act. *Jour. Farm Econ.* 16: 624-636. October 1934.

2. It was contended that the little fellow too often gets an unfair appraisal in the establishment of shipping quantities under a prorated scheme.

3. It was contended that the small farmers were often overlooked not only in consideration of the way plans would work, but in discussions preparatory to establishment of such control schemes.

4. It was contended that prorates are, as a matter of fact, established by the big producers purposely to "squeeze" the small ones.

5. Small producers perhaps more commonly than large ones have contended that curtailment schemes are useless and offer as proof the fact that prices under proration schemes during the past year in particular have been lower than in previous years without such schemes.

Under the earlier voluntary schemes there was really no occasion for such a controversy, because in the first place, if a man joined an association, all of his product was taken off his hands, and in the second place, either the small or the large man could get out of the scheme sooner or later by the ordinary process of withdrawal. At any rate, I have not come across a single mention of the contrast between the way such a proration scheme might affect small as compared with large growers in any of the voluminous discussions of earlier plans. Much of the discussion indicates clearly a lack of understanding of the whole problem. Thus the contention in point 1 above, that the little fellow will not have enough left to provide a living if he is forced to curtail, overlooks the fact that if a scheme is effective at all, it will help the small as well as the large operator so far as increasing gross returns is concerned. Such a matter as unfair appraisal for the small operator may arise out of the fact that the small farmer often does not know what his rights are or how to exercise, let us say, a right of appeal.

The above points, commonly brought out in hearings, overlook the basic difference only hinted at in the discussions. It seems to me that in general there are three points of conflict between large and small farmers under most proration schemes, all hinging on the fact that the operator's labor and that of his family are the main "stock in trade" of the small farmer:

1. Small farmers use family labor to a much greater extent in their farming operations than do large farmers. Hence curtailment of output will affect the net return of the two differently, even though the price is raised equally.

In order to show a little more concretely how the use of family labor affects the income of small as compared with large operators,

TABLE 1. SUGGESTED APPROACH TO COMPARISON OF SMALL AND LARGE FARMERS IN A PRORATE

(Figures are hypothetical, and to suggest kinds of data needed)

Case

- I Assume small farmer works 25 acres, large farmer 475 acres, and that cultural costs are \$20 an acre, one-half of which represents labor, one-half other expense; that harvesting costs \$5 a ton at market rates. Hence market values, costs and net returns will be:

	Small farmer (50 tons)	Large farmer (950 tons)	Total crop
Value of crop at \$15 a ton	50 tons = \$750	950 tons = \$14,250	\$15,000
Cultural labor	\$250	\$4,750	
Harvest labor	250	4,750	
Cash costs other than labor	250	4,750	
Total costs	\$750	\$14,250	
Net returns	000	000	

Note, however, that the small farmer doing his own work gets \$500 above cash outlay as a return for his labor.

- II Assume conditions are same as in Case I but that under a prorate plan the crop is curtailed 20 per cent, and that this raises the price at the farm $33\frac{1}{3}$ per cent. Some of harvesting costs are eliminated. Market values, costs and returns will be as follows:

Value at \$20 a ton,* only 80 per cent of crop harvested,	40 tons = \$800	760 tons = \$15,200	\$16,000
Cultural labor	\$250	\$4,750	
Harvest labor	200	3,800	
Cash costs			
Cultural	125	2,375	
Harvest	100	1,900	

Total costs	\$675	\$12,825	
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Net return	\$125	\$ 2,375	
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Note that here the small farmer gets \$450 for own labor in addition to the above net \$125.

Summary of cash returns:

	Small		Large	
	Total income	Income per acre	Total income	Income per acre
A. No control	\$500	\$20	\$ 000	\$000
B. 80 per cent curtailment	575	23	2,375	5

* Actually the effect of curtailment on price will vary widely with different crops and varying distances from market.

I have drawn up table 1 purely for illustrative purposes. I think most of the assumptions are within reason. The particular figures used would indicate that the small operator gains a little, whereas the large operator gains a great deal more, assuming the small

operator uses only his family labor and the large operator hires all the work done. Obviously there will be instances all the way between these extremes. In many instances, for example, even a small operator growing, let us say, only a single variety of fruit would have to hire some help, because the peak load was more than he and his family would handle in the limited period within which it must be done.

2. Small farmers frequently sell in the so-called "shorter trade channels," as for example:

- a. To consumers at the farm home—as when city consumers drive in and make purchases.
- b. At the roadside market stand or to operators of nearby roadside stands.
- c. Delivery to the homes of city consumers or sales at city public markets.
- d. Sale and delivery to village or city retailers.

Curtailement for such farmers obviously reduces family or personal labor applied as additional marketing service, and for this labor there is often no equally good alternative use. This loss is in addition to that illustrated in the accompanying table.

3. The small farmer differs on a third point from the large, namely, in the use of his own or his family's labor in harvesting and processing jobs on neighboring ranches or at local canneries.

An additional point should be made which is of particular importance in certain crops sold to processors, such particularly as olives and canning peaches. In the case of these crops small independent growers sometimes find difficulty in selling at all when crops are large, because some processors themselves produce much of their own supplies and because other producers belong to cooperatives which will take all their crops. Under a prorata scheme, on the other hand, the small operator is given his prorata share of the market because even the large operator with his own outlet must curtail his deliveries.

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INVESTMENT POLICY FOR FARM PURCHASERS

Often in recent years the young farm purchaser and manager has found himself thrust forcibly upon the rocks of bankruptcy because he has not understood how to formulate a non-speculative

type of investment program. How may such a policy be formulated? There are some general principles that seem to be pertinent to the formulation of such a policy and these may be arrived at more effectively if progress toward ownership is broken into three stages: (1) the initial, (2) the intermediate and (3) the mature.

1. In the initial stage immediately after purchase, cash reserves and titles to money are at their low point. It is fortunate that this particular investment stage should come while the prospective owner is still young, while his health risks are relatively small and while there is that surplus vitality that will permit strenuous efforts to earn outside income if financial emergencies are encountered before cash reserves are sufficiently high to provide the needed safety margin. The viewpoint or policy of the young investor in the initial stage, however, should not be, as it has so often been,¹ to take every cent of surplus or savable income and apply it on the reduction of contract or mortgage debt. Rather the viewpoint needs to be first to build up cash reserves and titles to money so that an adequate safety margin is established.

Just what is an adequate safety margin depends upon the type of farming, the stability of the farm income, the stage of the business cycle, the percentage equity, and the total amount of the contracted debt. There are also matters of climatic and weather risks, health risks and risks arising from pest damage that need to be considered in the establishing the level of needed cash reserves. This point is clear however: In this initial investment stage the first effort after purchase should be to restore ones reserves and these reserves should be maintained in the purer form of titles to money, that is savings deposits, government bonds, and reserves of that general nature.

There is a second aspect of investment policy that needs attention in this initial stage, an aspect that concerns operating capital. Investment safety is partly a matter of liquidity. Not all titles-to-property investments are equally liquid and operating capital investment is much more liquid than real estate investment. Some types of operating capital investment are for instance highly salable and wholly acceptable from a liquidity standpoint. Such would be stocks of grain or cotton, live stock and work stock which may usually be sold at any time. A young investor gains in liquidity

¹ And as certain modern texts in Farm Credit and recently published experiment station bulletins still advise.

and even in investment safety by building up and carrying large stocks of such operating capital.

Two major considerations govern the amount of investment in operating capital suitable to the initial stage. First, it remains a titles-to-property type of investment. That is, its power to command money and to liquidate debts is much like that of land or real estate itself. The more liquid forms of such capital are the farm products themselves, or the ones whose very price determines the young farmer's command over money. Their prices, furthermore, are, of the highly fluctuating type. Investment in these does not provide as great a safety factor as investment in direct titles to money.

Secondly, there is a sharp limitation to the amount of such capital that should be accumulated because of its effect on operating economy or efficiency. On every farm there is a most efficient proportion between operating and fixed capital. Any offense against this optimum reduces the efficiency of operation and, hence, income. In the following tables the effect of varying ratios of operating and total farm capital on farm labor income illustrate this point. Labor rather than farm incomes were chosen because it is so largely from labor incomes that farmers in the initial stage must make their savings and investments.

The data serving as a basis for table 1 were drawn from approximately 1000 farm management survey schedules gathered by the Department of Agricultural Economics of the University of Missouri over a period of years stretching from 1912 to 1930.² Data are universally from corn belt livestock or general farms but, since they were obtained from seven different counties, do not all come from exactly homogeneous type-of-farming areas. Furthermore the numbers of schedules is not the same for each year of the period. The table presents, therefore, the results of what may be termed a gross or unrefined analysis.

For farms badly under-equipped with operating capital: that is for those with ratios of from 1-10 per cent, labor incomes were negative more often than not and averaged \$-225. Each increase in the ratio of operating capital thereafter, to the highest class for which data were available, is accompanied by a decline in the per-

² The data were obtained in the first instance under the supervision of Professor O. R. Johnson of the Missouri College of Agriculture and have been analyzed in detail in a number of experiment station publications. See for instance Missouri Agricultural Experiment Station bulletins number 121, 140 and 142.

centage of negative incomes and a rise in average incomes. When, however, as much as 40-50 per cent of the farm capital was in operating equipment the average farm income shows a decline so that the optimum ratio, as indicated by these data, occurred at the 30-40 per cent ratio class. The number of farms in the last or

TABLE 1. FARM LABOR INCOMES AND RATIOS OF OPERATING TO TOTAL FARM CAPITAL FOR 937 MISSOURI LIVESTOCK AND GENERAL FARMS FOR THE YEARS 1912-1930

Ratios of Operating to Total Capital	Numbers of Positive Labor Incomes	Numbers of Negative Labor Incomes	Average Labor Income	Percentage of Incomes Negative
0-10%	38	58	\$ -225	60.4
10-20%	285	131	322	31.5
20-30%	238	49	514	17.1
30-40%	95	16	809	14.4
40-50%	24	3	439	12.5
	680	257	\$ 372	27.4

40-50 per cent class is so small, however, as to cast a shadow of doubt upon conclusions that might otherwise be drawn.

To strengthen the conclusions therefore a further analysis was made. In this latter case data from 433 contiguous farms located in Johnson County in an area of relatively uniform soils and type

TABLE 2. FARM LABOR INCOMES AND RATIOS OF OPERATING TO TOTAL CAPITAL, TABULATED BY FARM CAPITAL CLASSES, FOR 433 LIVESTOCK AND GENERAL FARMS IN JOHNSON COUNTY, MISSOURI FOR THE YEAR 1912
LABOR INCOMES

Farm Capital	Ratio 0-10%	Ratio 10-20%	Ratio 20-30%	Ratio 30-40%	Ratio 40-50%
\$ 0-\$ 5,000	\$ -63	\$ 12	\$ 166	\$ 490	\$ 169
5,001- 10,000	-94	114	326	492	294
10,001- 15,000	-30	286	436	497	-576
15,001- 20,000	-269	563	726	800	612
20,001-Over	-353	452	1179	1736	1200

of farming were used. These were cross tabulated so as to hold the total capital value reasonably constant. Such cross tabulation incidentally reduced greatly variations in average size of farms included in the various classes. The results are given in table 2. It is only fair to note that numbers of farms in the 1-10 per cent and the 40-50 per cent ratio classes were somewhat small. The data were all for the operating year 1912.

Average labor incomes for the 0-10 per cent ratio class were uniformly negative for each total capital class and the greater the total capital the greater the loss. In each of the three middle ratio classes average labor incomes are positive and show a quite uniform tendency to rise as the total capital invested in the farm increases. Average incomes for the 40-50 per cent ratio class, however, show a distinct decline from those of the preceding class and the declines occur uniformly; that is for each class.

The implications of the data of both tables not only corroborate one another but accord acceptably with conclusions suggested by *a priori* reasoning. Investment in operating capital can be carried so far as to affect adversely labor income.³ The beginning farm investor should quite clearly, however, equip himself well since there is so clear a response of labor income even to rather considerable outlays for operating capital. Just how far such investment should be carried will depend upon the size of farm, type of farm and a number of other circumstances. In general, while the farm should be well equipped, such investment can be carried too far, not only because of its effect on labor income but because of its interference with a balanced program of investment. That is after a certain point has been reached in operating capital investment both liquidity and (particularly) safety are much better provided by investment in reserves of titles to money as outlined above.

2. In the next or intermediate stage, after ones cash reserves have been built up to a reasonably adequate figure, the retirement of fixed debt incurred for the purchase of land or real estate should be the major consideration. However one other matter becomes of some considerable importance. One of the hardships of the initial stage lies in the fact that the needed investment in titles to money yield low rates of return as compared to the rates charged upon the debt that has been assumed. Bank deposits yield practically nothing. Savings accounts in banks yield only 2 or 2.5 per cent and government bonds yield less than 3 per cent at present. On the other hand mortgage indebtedness is scarcely ever obtained in normal times at a rate lower than 5 per cent or 4 per cent. In the initial stages it is necessary to accept this difference between 5 per cent and 3 per cent as a cost of insuring one's investment safety. In the intermediate stage the effort should be to diversify

³ See also the discussion by Hopkins, J. A., in Iowa bulletin No. 160, The use of efficiency factors in analysis of farm records." Pp. 133-135.

ones investment in titles to money so as to obtain a rate of return more nearly commensurate with the one that is being paid upon the farm mortgage debt. In order to obtain such diversification the investor moves away from government bonds and similar types of investment and purchases rather the higher grade industrial bond or railroad bond, or perhaps some of the best of the preferred stocks.

3. In the mature stage of investment, after a large part of the farm debt has been retired the investor may move still further toward a balance in return on titles to property and titles to money. In the initial stage the difference in return from titles to money and cost of debt are at their maximum. In the intermediate stage they approach more nearly to equality and in the mature stage there may be little reason for any difference in the two whatever. That is one may diversify one's investments in titles to money and titles to property so that the return, on the whole, is equal to the rate of interest being paid on the farm mortgage debt. With the retirement of debt and the growth of ownership equity the need for safety declines and the ability to take risks increases.

Even in the mature stage, however, some investments in titles to money of the purer types such as government bonds may be advisable but there is also room for such investments as those in common and preferred stocks of corporations and the like which, while being titles to property rather than to money, yield relatively high returns, and have the additional advantage that they can be quickly converted to cash in times of need. That is, one aspect of investment safety concerns liquidity. Common stocks are titles to property but they are much more promptly convertible into cash than is land or real estate.

One assumption in all the above has been that farmers and farm land investors will have sufficient incomes so that they may save something in addition to the costs of the years operation including living expenses and the servicing of farm debt. Such an assumption may be untenable for a considerable number of purchasers of land. In cases where the investor is unable to follow the program outlined herein there are usually one of two underlying faults. First the investor may not have the judgement and the capacity to enable him ever to own a farm. Each generation must discover by the trial and error method those among them who can attain ownership; many cannot. Second, those with undeniable capacity

may nevertheless have made mistakes in their first investment of contracting to pay too much or of purchasing too large a property. No subsequent investment program can correct for such errors.

For those actually capable of progressing toward ownership there will be years of higher income when crops and prices are good and years of less than average income in contrary situations. Years of less than average income may reduce cash reserves. Those of more than average income may be used to build up cash reserves. Furthermore, for this group there will be growing equities with advancement toward the middle and maturer stages of investment just outlined. If this progress is maintained the total farm income will rise so that the provision for investment in titles to money and the later diversification of investment will normally become an easier matter with the passage of time.

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ECONOMIC ASPECTS OF HYBRID CORN—FURTHER CONSIDERED

The excellent article by Professors Dowell and Jesness on the "Economic Aspects of Hybrid Corn" in the May 1939 issue of the *Journal of Farm Economics* deserves the close attention of all who are interested in technological developments in agriculture and their probable economic effects. Hybrid corn is certainly one of the most spectacular technological developments in recent agricultural history.

The purpose of the present note is merely to suggest that there are other technological developments perhaps less spectacular but of equal importance which need to be considered if the hybrid corn development is to be correctly evaluated. It is against a background of joint economic consequences of a number of technological forces that we need to appraise the probable effects of any single one.

As technological "tortoise" to our hybrid corn "hare" let us consider tame hay. Although less recognized, tame hay has been passing through a period of technological development with an equally rapid effect on normal yields. The essential technological change in the case of both corn and hay has been the increasing proportion of higher yielding varieties in the total acreage of each. In order to facilitate comparisons, suppose we take the same 12

Corn Belt States studied by Dowell and Jesness. In table 1 are shown for each State the 10-year average yields of all tame hay for the period 1923-32 compared with the 1938 normal yields. A word of explanation about the method of computation is necessary. Yields for all tame hay were computed for each State by listing

TABLE 1. NORMAL YIELDS OF ALL TAME HAY IN THE 12 CORN BELT STATES FOR 1923-32 AND 1938

State	Average yield 1923-32 ¹	Normal yield 1938 ²	Percentage in- crease in normal yield
	<i>Tons</i>	<i>Tons</i>	<i>Per cent</i>
<i>Eastern Corn Belt</i>			
Ohio	1.11	1.19	7
Indiana	1.16	1.24	7
Michigan	1.18	1.26	7
Illinois	1.20	1.26	5
Wisconsin	1.46	1.63	11
Sub-total	1.24	1.34	8
<i>Southwestern Corn Belt</i>			
Missouri	.94	.99	5
Kansas	1.60	1.58	-1
Sub-total	1.11	1.14	3
<i>Northwestern Corn Belt</i>			
Iowa	1.38	1.56	13
Nebraska	1.61	1.65	2
Minnesota	1.42	1.54	8
South Dakota	1.03	.98	-5
North Dakota	1.16	1.16	0
Sub-total	1.36	1.46	7
Total	1.27	1.36	7

¹ Average yields for 1923-32 for each State are computed by weighting the 1923-32 yield of each constituent type of hay by the 1929-33 acreage of each hay. Totals and sub-totals are further weighted by 1938 total acreages in order to compare with 1938.

² Normal yields for 1938 for each State are computed by weighting the 1923-32 yield of each constituent type of hay by the 1938 acreage of each hay.

the acreages (for 1929-33 and 1938, respectively) of the constituent types of hay included in all tame hay, multiplying each by its 1923-32 average yield, summing the production totals, and dividing by the total acres of tame hay. The two sets of yield figures resulting from this calculation when compared show the change in normal yield of all tame hay due to the change in proportion

of the total acreage devoted to higher yielding hays. The average increase in yield for all 12 States was approximately 7 per cent. It varied from a decrease of 5 per cent in South Dakota where drought conditions have greatly reduced alfalfa stands to an increase of 13 per cent for Iowa.

It should be noted that there is no forecast in any of this. The only assumption involved is that the 1923-32 average yields of each class of hay represent a normal yield per acre for that class of hay. On the basis of this assumption, these changes in normal yield per acre for hay in each of these States actually occurred between our base period (1929-33) and 1938. During these same years what happened with hybrid corn? According to Dowell and Jesness, 31 per cent of the acreage of these States, or 16 million acres, was put into hybrid corn. On this acreage, increases in yields are estimated to have been from 5 to 15 per cent. Suppose we assume 12.5 per cent. This would amount roughly to 4 per cent or less than two-thirds as much as in the case of hay.

But suppose we go further and assume that the entire anticipated increase in yield of hybrid corn is presently obtained. In table 2, by simply carrying Dowell and Jesness' computations one more step we have obtained an estimate of the probable normal yield on the entire corn acreage after hybrid corn has been as widely adopted as they estimate. For the entire 12 States the weighted increase in normal yield is estimated to be 16 per cent. This compares with the 7 per cent for all tame hay, already obtained. If we were to have a further increase in hay yields during the next 10 years about equal to that which has occurred since 1929-33 there would be very little difference in the percentage changes.

Now what does all this mean in terms of production? Dowell and Jesness have estimated on the basis of 1929-33 corn acreages that hybrid corn would mean an increase of over 300 million bushels in production. But from 1929-33 to 1938, for well-known causes, there has been a decrease from 65,405,000 to 52,880,000 acres of corn in these 12 States, or almost 20 per cent. This has been more than enough to offset the increase in normal yield. If we multiply the 1929-33 corn acreage by average yields for 1923-32 and 1938 corn acreage by the Dowell and Jesness estimates of probable normal corn yields after hybrid corn has reached its ultimate adoption we get about 1.5 per cent reduction in normal

production as compared with about 7 per cent increase in normal production for hay estimated in the same way.

Since the corn acreage is still about twice as large as the tame hay acreage in the Corn Belt and average nutrient production per acre is slightly greater from corn than from hay, the 1.5 per cent

TABLE 2. AVERAGE YIELDS OF ALL CORN IN THE 12 CORN BELT STATES FOR 1923-32 AND PROBABLE NORMAL YIELDS AFTER HYBRID SEED HAS BEEN WIDELY ADOPTED

State	Average yield 1923-32	Normal yield after hybrid corn has been widely adopted ¹	Percentage in- crease in normal yield
	<i>Bushels</i>	<i>Bushels</i>	<i>Per cent</i>
<i>Eastern Corn Belt</i>			
Ohio	36.6	42.4	16
Indiana	34.6	41.2	19
Michigan	29.8	32.8	10
Illinois	36.0	41.8	16
Wisconsin	32.0	36.8	15
■ Sub-total	34.9 ²	40.5 ²	16
<i>Southwestern Corn Belt</i>			
Missouri	25.0	29.0	16
Kansas	19.3	22.2	15
Sub-total	23.0 ²	26.7 ²	16
<i>Northwestern Corn Belt</i>			
Iowa	37.8	44.6	18
Nebraska	24.0	26.9	12
Minnesota	31.2	36.8	18
South Dakota	19.2	21.5	12
North Dakota	18.5	20.4	10
Sub-total	29.9 ²	34.7 ²	16
Total	31.0 ²	35.9 ²	16

¹ Computed from Dowell and Jesness estimates of probable increase in yield per acre from hybrid seed and probable percentage of acreage that will ultimately be planted to hybrid seed in each state.

² Totals and sub-totals weighted by 1938 acreages.

decrease in corn represents a larger change in feed nutrients than the increase of 7 per cent in hay. Likewise a given percentage increase in corn yields represents a greater gain in feed nutrients on a per acre basis than the same percentage increase in hay yields. It is apparent that the relative future significance of these two technological developments will depend upon future trends in the

total acreages of the two crops which may be influenced by many other factors in addition to yields per acre.

Perhaps these few comments are enough to indicate that further study not only of hybrid corn and improved hay, but of other technological developments will be fruitful.

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THE MUNICIPAL MILK PLANT OF WELLINGTON, NEW ZEALAND

The problem of developing a workable and efficient system of milk distribution, a question that concerns us considerably in the United States today, was satisfactorily solved by Wellington, New Zealand, a city with a population of about 143,000. Since 1918, milk has been distributed by the city-owned Milk Department which operates as a semi-monopoly.¹ The Municipal Milk Act grants the city a monopoly and private distributors have been eliminated except for small producer-distributors.²

Wellington has pasteurized, bottled and distributed its milk in a centralized system that seeks to rationalize milk distribution by eliminating duplicated effort. Thus, delivery overlapping, which occurs when many distributors deliver milk in the same area, is minimized, and maximum plant capacity is utilized. Each morning, city milk wagons are sent out with full loads of about 80 gallons of milk (400 quarts or 800 pints—usually a mixed load) and large lorries make several trips to these field wagons to replenish their milk supply and save their return to the central station for refill. No other wagons operate (except those of small licensed producer-distributors); duplication is thus minimized and full capacity realized. Nearby farmers are allowed to sell up to 30 gallons of milk per day and are, with few exceptions, not allowed to purchase milk for resale except from the City Milk Department. They distribute approximately 2,000 gallons per day as compared to 5,300 gallons distributed by the Department.³

Milk is bought by the Milk Department from the Wellington

¹ Wellington City Council, The Milk Committee: A brief history of the municipal milk supply. Wellington, New Zealand.

Wellington City Council, The Milk Committee: The realization of an ideal. September 1931.

² The Wellington City Milk Supply Act, 1919, No. 17, Sec. 6.

³ *Op. cit.* Realization of an ideal p. 14.

Dairy Farmers' Cooperative Association. Prices to producers are determined by: (1) butterfat content and weight, (2) a basic price, payable in the summer season of eight months, founded on the prices of New Zealand butter in Wellington and London (each carrying one quarter weight) and the price of New Zealand cheese in London (carrying two-quarters weight). Compensation is made for the cost of licensing dairies, the extra expense incurred by cooling fluid milk, and for the loss of by-products. (3) A premium is allotted for winter milk (four months) which is added to the basic price or the average price paid for the preceding summer season with a guaranteed minimum.⁴

Retail prices are fixed in advance by estimates of forward costs of milk and cream to the Milk Department for the coming season. (Fluid milk is not standardized, that is, it is sold as received and not skimmed to minimum requirements as the practice is in the United States). This system of price determination is economically sound since prices are not fixed arbitrarily but rather depend to a large extent on the wholesale market prices of butter and cheese which represent the alternative uses to which fluid milk may be put. Milk prices are placed in direct relationship to market conditions and vary with these conditions although a floor is set by guaranteeing a minimum price and by compensation for the extra cost of producing fluid milk. However, prices vary above this floor as market conditions warrant. Thus, instead of fixed prices determined arbitrarily or by rigid cost of production study, market adjustment is made automatically in the price formula.

For either retail or wholesale prices, "the council's attitude has been at all times to balance as far as possible conditions between producers and consumers so that farmers shall be encouraged to produce . . . sufficient milk to meet the needs of consumers . . . at a reasonable price."⁵

To eliminate costs that tend to raise the price of milk, the Milk Department has instituted a non-credit system for retail milk sales. Tokens take the place of money and are distinguished in metal and shape for summer and winter milk, (different prices) and for quantity. Filled bottles are exchanged for empty bottles plus tokens that must be surrendered on delivery of fresh milk each morning. No milk is delivered if no bottle and token are obtained.

⁴ Ibid. p. 8-9.

⁵ Ibid. p. 10.

In this way, responsible consumers pay for bottle breakage and the Milk Department has no credit problem, thus eliminating two cost factors which tend to increase the price of milk. This feature of the system is not entirely desirable. There is a possibility of consumer oversight in placing tokens and bottles on the threshold each morning, a deficiency that can cut consumption by excluding forgetful purchasers from sales, and also minimize the service utility that the routeman performs by delivering milk without fail each morning, even if consumers overlook placing bottles and tokens on their doorsteps. Part of valuable milk service stems from the fact that consumers do not wish to be burdened by remembering their milk needs for each day. The partial solution for this problem is payment in advance.

Provision is made for the poor in the Act that created the Municipal Milk Department. "The Council may, out of its District Fund, purchase milk for the purpose of supplying the same to the poor, and may supply the same free or at such reduced charge as it thinks fit to such persons."⁶

From 1923-1931 profits have been shown by the Department, although up to 1923 losses were incurred in adjusting the business. In the period 1935-1936, a loss of £23 was indicated and in 1936-1937, profits amounted to £5,344. In 1936-1937 the average cost of first grade milk delivered to the depot was 11.162 pence per gallon of which farmers received 10.485 pence per gallon after transportation cost had been deducted. The average price per gallon of milk sold was 21.249 pence leaving a margin of spread of 10.087 pence including profit of 9.568, excluding profit. The average retail selling price of bottled milk was 23.083 pence per gallon.⁷ (The New Zealand Pound is valued at \$3.77 or 1.57¢ per pence as of June 14, 1939.) The Milk Corporation is exempt from land and income taxes but pays regular rates for electricity and water.

The benefits of this municipally owned and operated enterprise are: 1. High quality milk supplied to the citizens of Wellington, both rich and poor. 2. An efficient, low cost and workable system for both farmers and consumers. 3. The development of the best type of milk plant for the municipality. 4. The return of profits to the consumer in the form of lower prices and taxes. 5. Development of community consciousness and cooperation.

⁶ Wellington City Milk Supply Act, 1919. No. 17, Sec. 14.

⁷ Herron, R. E., General Manager Wellington Municipal Milk Plant. Type-written Statement of Revenue and Expenditure, for year ending March 31, 1937.

Such municipal operation has been undertaken on a small scale in the United States since October 1918 in the town of Tarboro, North Carolina.⁸

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INTENSITY AND LAND RENT—A REJOINDER¹

The disturbing of the comfortable dogma that intensity and rent are direct corollaries of one another was sure to excite protest. The MacFarlane reply to my "Intensity and Land Rent" article is such a protest albeit a protest of a particular type. He does not, in so many words, disagree with the fundamental thesis of my article that there is no necessary relationship between intensity and rent though he speaks with great sympathy of those types of land classification that attempt to grade land upon the basis of differing intensities. His own stand is, therefore, somewhat vacillating.

His first specific point is based upon a misapprehension of the general content of my article. He states that I wish to make a world wide classification of land upon the basis of variations in capacity and efficiency. I have, however, no such desire and have indicated my stand with respect to the theory of land classification in quite other terms.² To maintain that intensity of use is not a proper basis for classifying land, save, perhaps, in restricted areas, is by no means the same thing as stating that I wish myself to use capacity and efficiency as the basis for a world wide system of land classification.

The next point of importance refers to tables 1 and 2 of my article which, Mr. MacFarlane believes to provide no worthwhile information on relative intensities. Yet it must be very disturbing to those who regard rent and intensity as mere corollaries of one

⁸ Nixon, A. J. and Reed O. M., Dairy Section, Agricultural Adjustment Administration, U.S.D.A. Municipal milk distribution in Tarboro, North Carolina. December, 1938.

Other References: Wellington City Milk Supply Amendment Act 1926, No. 4. Wellington City Council: Report of the municipal milk department special Inquiry Board, September 25, 1924.

¹ Jour. Farm Econ., 20: 786, 1938.

² See for instance (1) Missouri Agricultural Experiment Station Research Bulletin No. 229, (2) An approach to the grading of land for purposes of appraisal, Jour. of Farm Econ. 18: 523, 1936, (3) Land classification as an aid in appraisal.—Paper delivered at the Farm Appraisal Conference, University of Illinois, October 28, 1938.

another to find that Kentucky and Tennessee, with less than three quarters the area of Iowa and with far lower grade and less valuable land, have, roughly 25 per cent more farms and 35 per cent greater farm populations. If indeed intensity and rents are corollaries one might have expected Iowa to have had greatly more farms and farmers: perhaps 50 per cent more. So large a divergence of empirical data from the expectation suggested by current economic texts is, to me, significant even if it leaves Mr. MacFarlane quite unaffected.

My article went no further than to state that the data on "farm population and labor intensities in these states, therefore, clearly do not accord with the presumption that intensity reflects rents." Mr. MacFarlane makes an easy dismissal of table 1 because no data on capital or management applications are included. (He apparently has made no attempt to supply these missing links himself.) For two reasons his dismissal is too facile. First, farm management research over three decades has made clear that labor inputs far overshadow capital inputs for most types of farming. Labor costs (explicit and implicit) are commonly twice or even three times capital costs. Second, all types of labor have some management and direction connected with them. That is Kentucky and Tennessee farmers supply management too and quite surely a large amount of management. The differences at best are only those between two fairly high levels and, while Iowa farmers may supply more management (though they may also supply less) they would need to supply vast amounts more of capital or management or both to compensate for the extreme differences in labor intensity noted above. Until better proofs than those offered by Mr. MacFarlane are prepared the great differences in labor intensity cannot be dismissed so easily.

With respect to table 2, Mr. MacFarlane's chief objection is to my use of surface soil nitrogen content. Nitrogen figures were used merely because they provided a means of combining readily all classes of land within a farm, namely, cropland, pasture land, woodland and so on. For that purpose they proved useful. There is, however, absolutely no need to insist upon the use of nitrogen. Let it go. Abundant evidence exists in Missouri and elsewhere that even upon a unit of area basis intensities need not and often do not reflect rent.

Mr. MacFarlane's final misapprehension of the meaning of my

article arises in connection with the measurement of efficiency. He states that I introduce "the idea that net efficiency and rent can be determined from the slope of the marginal productivity function, given the cost per unit of the variable element." I am sure, however, that Mr. MacFarlane received the introduction from some one else since nowhere in this connection do I mention "slope." Indeed I say nothing about the measurement of efficiency since no mention of it was needed in support of my thesis. Throughout the relevant sections of my article efficiency was used (as it is commonly used) as one dimension of a figure the area of which represents productivity. That is, it was used in the sense that "efficiency times capacity equals productivity." The particular figures referred to, were triangles CEF, CEG and DEH. These are all right triangles and efficiency in each case is a correlative of half the altitude. The entire latter part of Mr. MacFarlane's comment has, therefore, no relevancy to my thesis and the eclipse of the functions to which he alludes is entirely one of his own manufacture.

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REVIEWS

Economics of Peasant Farming, by Doreen Warriner. London, Oxford University Press, 1939. Pp. 200. \$4.25.

A book that should be read and pondered particularly by two groups of farm economists: first, by those who are overimpressed by the hard lot of the American farmer, and second by those who believe that the problems of the farmer can be solved within a single country. In saying this, the reviewer does not mean to deny, either, that the lot of the farmer really is a hard one in many areas, nor that there are no problems that can be solved within these United States.

Warriner's book gives us a detailed picture of the farm problem of Eastern Europe. The difficulties of the Eastern European peasant touch the economic structure and the political aspirations of Western Europe; and through the export trade Western Europe touches the cotton grower of the South and the hog producer of the Corn Belt.

The first part of the book sets forth the general agricultural problem of Europe as well as its relation to the situation of industry. The following chapters describe the farming methods, population problem, standard of living, and recent economic and political trends of the area, which includes Poland, Hungary, Jugoslavia, Rumania, and Bulgaria. The concluding chapters deal with the advantages and disadvantages of peasant farming (i.e. small, family farms), a discussion of whether the Russian collectivization method could be applied in Eastern Europe, and conclusions regarding the outlook for the peasant States.

In the nineteenth century population in every country of Europe increased rapidly. In Western and Central Europe industry grew fast enough to absorb at least part of the natural increase. Thus the peasant farms could be handed down intact from generation to generation. "Farther east, as in Galicia, population increased, but industry did not expand. The land had to support a bigger population . . . So each generation saw the farms getting smaller and smaller. . . . Thus growing poverty caused excessive splitting up of the land, which in turn made economic utilization of the soil impossible." The result was subsistence farming of the worst kind, with excessive population density on the land, inadequate capital, and labor intensive methods. Further, population is still growing

so that there is a danger that even the present unsatisfactory standards cannot be maintained.

"This situation is fatal to economic and social welfare. A land of dwarf holdings, literally 3 acres and a cow, is a nightmare of degradation and poverty. Of course, Southern Poland is exceptional; it is a society in decay, with the fertility of the soil declining. The other regions of Eastern Europe are not in this state, but as things are at present they must eventually go the same way. Their future depends on *not* remaining self-sufficient. Either they must find outlets for farm produce, or farm labour, or develop industries."

Adjustment, Warriner says, seems to be possible in one of two ways; to keep the present farm structure and go over to more intensive methods in the form of more livestock farming, vegetable and fruit production, etc., or else go over to the Russian model of large-scale collective farming. The latter, however, turns out to be hardly applicable in most of Eastern Europe. In Russia this method provided a means of transforming the village into a mechanized farm and of obtaining an increased number of industrial workers, as well as population to colonize new areas where land had been incompletely utilized before.

The first alternative seems to offer more for Eastern Europe, but there are some very serious difficulties in its way. In the first place, capital is lacking, and the inability of the peasant farmers to increase their production appears to Warriner to come to a marked degree from inadequate capital accumulation. To the reviewer this smacks a little too much of the excessive simplicity of nineteenth-century economics. If the recent discussions of technological improvements in agriculture have any meaning, it is that the form of capital is often much more important than the amount. And this seems to apply in Eastern Europe, since Warriner suggests that the most obvious way out is by changing the type of agriculture. The lack of even a small supply of new capital to the peasant farmer, however, is of importance in that some is needed for a change in type. But the seat of the trouble is clearly in excessive population on the land rather than in a shortage of capital.

To improve the condition of the Eastern European peasant it would be necessary to draw off at least a part of the population now on the land and to increase the output per capita of the rest. But the Western European countries, which would logically form

the market for a larger output of produce are attempting to foster self-sufficiency within their own borders and have built up, behind tariff barriers, a structure of agricultural prices much higher than in the countries farther east. To admit greater imports from Eastern Europe (or from America, for that matter) would mean lower prices for their own peasants. Further "if farm protection were abandoned, the influx of labour from the land would certainly lower the money wages of the town workers. If organized labour objects to a rise in prices (and many economists now regard this theory as axiomatic), then tariff policy is intelligible, though short sighted, since it necessarily stands in the way of a future rise in the standard of living."

Even with markets abroad opened to farm produce, Warriner believes that only Hungary and parts of Rumania would find their standards of living much improved. For the rest of Eastern Europe population would still remain excessive, so that industrialization or large scale migration appear to offer the only hope. Even for industrialization, capital is lacking in these countries. It is true that an alternative seems to lie in the extension of German dominance over Eastern Europe and its inclusion in the German economic system. But the Nazi system aims only at increasing the power and self-sufficiency of Germany, and Eastern Europe would be included only on a basis of dependence, with its exportable surplus absorbed on unfavorable terms.

A European custom union, Warriner thinks, would help considerably in bringing about an adjustment advantageous to Eastern Europe. This, however, would mean cheaper food for Western Europe and a reduction in the farm population of Europe as a whole. Further, it would mean a serious readjustment in industries because of the great influx of labor from farms, and it would also mean further readjustments for the overseas countries now producing export surpluses.

American farm economists will find Warriner's book well worth reading, even though this requires wading through some rather tiring chapters of detailed description of peasant methods and conditions. For the most part, the work is done in a painstaking and scholarly manner. The implications of future adjustments which are likely to touch America as well as Europe are too important to be passed by.

JOHN A. HOPKINS

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Economic Adaptation to a Changing World Market, by Carl Major Wright, Copenhagen: Ejnar Munksgaard, 1939. 305 pp. 8s. 6d. net.

This book is an attempt to lay the foundation of an effective international policy for small countries, which are characteristically more dependent on the world market than large ones and are under a pressing need to maximize gains from trade in that market on the one hand and to minimize the unfavorable effects of its oscillations on the other. The small country is virtually impotent to influence world market development through intervention, while a policy of economic isolation, save temporarily in depression, would be tantamount to economic suicide. Consequently, the most rational alternative is to develop a program of rapid adaptation to world market oscillations which will enable it to "ride the waves of economic change." It is the author's contention that "by careful study of the world market, pressure applied, not only on the right industries but at the right moment in the trade cycle, may transfer resources from stagnant to developing industries in such a way as to yield permanent real benefit and break down vested interests." (p. 268.)

But why not leave the problem of adaptation to the entrepreneurs? To this, Dr. Wright replies that the modern economy is so honeycombed with monopolistic elements that a rational adaptation on the part of entrepreneurs cannot be anticipated. State intervention is therefore necessary. Furthermore, since governments frequently intervene to buttress the position of industries rendered unprofitable by changes in world market conditions, it is necessary, if the economy is to be relieved of their incubus, that governments be equipped with a machinery which will enable them shortly to effect a transfer of resources from those industries into more profitable ones.

Most of these general aspects are treated in the first and last chapters. The five intervening chapters are devoted to pointing out the various elements that must be considered in the formulation of a policy of adaptation, and to indicating the gains that such a policy might achieve. Specifically, these chapters contain a discussion of changes in the world market, with special reference to establishing price and income elasticities of demand, and price elasticities of supply for various commodity groups; and a discussion of the nature of the international business cycle and its impact

on the national economy, with special reference to the mobility of capital and labor in the several phases of the cycle and proper government policy to stimulate revival. Under these broad headings, Dr. Wright grapples with a host of problems including methods of measuring the relation between income and the demand for particular groups of commodities, the determination of the length of the production period in individual industries, the causes underlying the spread of the international business cycle, the effect of standards of living on the mobility of labor, and the economics of public works.

Risking an undue simplification, the net result is roughly as follows. Through the determination of the elasticities of supply and demand for the commodities which a country may produce and import, combined with a determination of the elasticities of the factors of production, a knowledge of the possibilities of industrial relocation among competing countries and of the impact of the international business cycle on the domestic structure of production; it is possible to determine the most profitable as well as the most depression-resistant allocation of resources within the country in question. Since the mobility of the factors of production is greatest during prosperity, while the most pressing need for their reallocation occurs during depression, it is necessary and feasible for the government to undertake policies of revival which will facilitate transfer to the more profitable industries.

In the opinion of the reviewer, the effectiveness of Dr. Wright's argument is impaired by his habit of restating at some length the theories and findings of the writers upon whom he chiefly relies. Thus a considerable amount of space is given to C. C. Zimmerman's investigations bearing on the validity of Engel's law, Wagemann's analysis of the spread of the business cycle, Tinbergen's macrodynamic analysis of the cycle, and Chamberlin's theory of monopolistic competition. Not only is the thread of the author's own thought broken, but he leaves the impression of groping for support.

Both in general and in particular, a large number of the problems raised are controversial ones, and it seems likely that there will be a few readers who will not have misgivings at one point or another. The reviewer is sympathetic to the idea of taking steps to improve a country's mechanism of adjustment. His own investigations into the international sugar problem, for example, indicate that the

action of the Dutch Government in Java has greatly facilitated the adaptation of its sugar industry to changes in the world market and that more effective measures of rationalization might have been taken in Cuba. At the same time he wonders if the adaptation by entrepreneurs in small countries has on the whole been as uneconomic as Dr. Wright seems to imply in his last chapter. Empirical studies comparing actual adaptation with that indicated by general economic analysis would seem desirable. On two particular points the reviewer is considerably less optimistic than the author, namely the possibility of deriving accurate measures of supply elasticities and the possibility of a small country effecting a revival in the face of world depression without permanently impairing its international position. It also seems worth noting that the adaptation policies of a small country may be thwarted by political forces. Thus if small country A could improve its economic position by integrating its economy more closely with that of B but in so doing would reduce its trade with C, it might find the latter hostile to such a policy and prepared to prevent it.

Dr. Wright is to be commended for plunging boldly into a very complex problem. The intricate issues with which he has been forced to deal clearly demonstrate that economic control by the state is a complex process demanding economic and statistical analysis of a high order, not to mention the need for competent administrators and a legislative body committed to this type of action. Curiously enough, his effort might well evoke antithetical reactions. For persons disposed toward economic control, the analysis elucidates intriguing possibilities; for those who eschew such control, it could serve as a demonstration of insuperable difficulties.

J. P. CAVIN

Bureau of Agricultural Economics

The Sugar Economy of Puerto Rico, by Arthur D. Gayer, Paul T. Homan and Earle K. James. New York, Columbia University Press, 1938. Pp. xviii+326, \$3.75.

Puerto Rico has to support about 1.8 million people in 3,600 square miles. A highly commercialized agriculture helps sustain this tremendous density of population. Sugar cane is the principal crop. Sugar constitutes around 60 per cent of yearly exports. Sixty-four per cent of the total output is produced in lands controlled by

the sugar mills, the remainder on independent farmers' land. Four American-owned mills produce 31 per cent of the total sugar production. Sugar mills control 51 per cent of the total area of the land in farms growing sugar cane. The four American companies control 24 per cent. About 70 per cent of the 7,700 farms growing sugar are 25 acres or less. But 66 farms with over a thousand acres control 66 per cent of the land in farms growing sugar cane.

"The Sugar Economy of Puerto Rico" is a scholarly contribution dealing with the economic and social problems arising from the situation briefly described above. Its outstanding merit is the meticulous care to maintain an objective viewpoint apparent throughout the book. The first five chapters give the background of the Island's economy. In Chapters VI to XVII, the sugar industry is described. This section is predominantly factual. Chapters XVIII to XX present the conclusions and opinions of the authors.

The book is not final in any sense. The authors frankly recognize the lack of facts on many phases and wisely avoid definite conclusions. It makes, nevertheless, interesting and stimulating reading. The assembly in a single volume of a multitude of facts previously scattered in many publications is a great service. The logical critical appraisals of the data, and of conventional interpretations of it, will be a considerable aid to students of insular conditions. The book is mostly based on information previously available, but several original factual contributions are made. It suffices to name a few: a detailed presentation of the land owned by each sugar mill, by municipalities; seasonal variation of employment; and some estimates of the amount of production credit used by cane growers.

Various sections deserve praise. The introductory chapters give a clear picture of conditions in the Island. The concise description of social frictions in Chapter XIV is very effective. Section 4 of Chapter X dealing with crop loans is informative on several of the main problems in the production credit field. Wisely the authors bring up, but do not pass judgment on, the question of interest rates. A striking example of rigorous objectivity is given in the section on Conclusions of Chapter II on Supplemental Incomes of Wage Earners. The discussion of the outlook for further political intervention with the Sugar Industry found in section 5 of Chapter XVIII is impressive for its realism.

The authors accepted few of the popular ideas currently ex-

pressed in Puerto Rico without factual verification or logical analysis. Unfortunately they accepted one of the most prevalent and significant. On page 261, they say, "... Much of its (P. R.) land is ineffectively utilized ...". On page 295, they add, "Two outstanding facts about Puerto Rican agriculture are the limited extent to which arable lands are now utilized at all and the poor technical quality of agriculture for other crops than cane ...". There are no facts on the extent of land fit for cultivation. There is no study of land classification in Puerto Rico showing what percentage of each land class is used. For an area that has been settled for a long time, the economic presumption is that the amount of land used is what the farmers have found by experience to be profitably cultivated under existing conditions. Whether the assumption is right or wrong in fact doesn't alter this argument. It is only intended to emphasize the need of evidence. The authors state their opinions as facts and no evidence is offered to back their opinions. The same logical approach serves to question their opinion as to technical character. The technical character may be poor but may be the one economically justified in view of the relationships of price and costs. I doubt very much whether Puerto Rican agriculture could withstand increases in cost whatever their effect on yield in view of the present market outlook for most crops other than sugar cane. In recommending technical improvement, it is believed that a distinction should be made between a better utilization of present inputs and an increase in inputs. The opinion as to land use is to be regretted particularly because it may divert the attention from other far more important phases of the Island's problem.

On page 296, the authors present their views on the relationship between yield per cuerda and size of farm. It is believed that in this analysis not enough weight is given to soil differences between small and large farms. A lower yield may be economically more productive in a poorer soil than a higher yield. In the analysis as to the most economic size of farm unit, not enough weight is given to the situation on different soil classes. The more efficient size of the farm unit may be different under different soil conditions. Probably in the extensive level areas of deep, rich, heavy soils of the coastal plains, large-scale farming enjoys considerable advantages. It is questionable whether those advantages may persist in the rolling and relatively shallow soils of the hilly areas. On page 297, it is stated that "... There is no doubt that quite small-

scale farming is poorly adapted to cane culture " It may be necessary to modify this statement if factual studies prove the relationship between soils and optimum size of farm. Furthermore, "quite small-scale farming" is an elastic term.

Throughout the book, the authors refer time and again to the impingement of the American commercial methods on the traditional Spanish landed aristocracy as one of the most important causes of social friction. This is an interesting sociological explanation which, unfortunately, cannot be tested factually. It is believed, however, that its importance is over-emphasized.

The discussion on Obstacles for Economic Expansion (Chapter XVIII, Section 4) suffers from an undue emphasis on the mortgage debt situation and an inadequate short section on marketing problems. It is granted that an excessive mortgage debt thwarts initiative. But it is even more important to emphasize why this debt cannot be paid than the debt itself. The analysis of the agricultural marketing problems falls short of offering the explanation from the marketing field. Marketing is dismissed in less than a page. It is discussed from a too general point of view. The conventional approach of finding fault with the market structure is followed. Deprived as it is of an adequate analysis of the complex factors underlying the marketing situation, this approach is considered of little value.

Too little emphasis is placed on the loss of markets in discussing the coffee and fruit situation. On page 36, a footnote reads, "The 1929 figure of coffee acreage is relatively meaningless except as an illustration of a social economic lag." The figures were far more meaningful. In 1935, the decline in acreage from 1929 was less than 5 per cent, but production more than trebled.

In a footnote on page 102, the authors say in reference to the number of sugar cane farms that ". . . The larger AAA figure based on actual grower's contracts is presumably more accurate than the P.R.R.A. Census figures. . . ." This is based on a mistaken interpretation of a newspaper release. The number of 6,620 sugar cane farms refers to farms receiving the larger proportion of their income from sugar cane, a type-of-farming definition. Actually the Census enumerated 7,089 farms growing sugar cane, which is more nearly comparable to the 7,693 farms figure of the AAA. It must be stated that the AAA figure is based on contracts and some farmers may have more than one contract.

It is a pleasure to welcome this valuable addition to the limited

bibliography on Puerto Rican economic problems. In general, the book is suggestive rather than conclusive. It is hoped that it be used as a starting point and that it serve as a stimulus for further volumes.

S. L. DESCARTES

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Analysis of Interregional Competition in Agriculture, by Sherman E. Johnson, Frank T. Hady, and others, Washington, D. C., Bureau of Agricultural Economics (mimeographed), 74 pp. 1939.

It has for some time been recognized by governmental officials, economists, and observers generally, that, if governmental controls over agricultural production and distribution are to be continued and even to increase in scope, much more complete information must be available with respect to the interrelationships and the effects on the economy generally of the various sorts of controls now in use and under consideration. As the authors of this report suggest: "Grave questions have arisen with respect to whether the new (production) choices open to him (the farmer) are reasonably effective in achieving the maximum economic utilization of agricultural resources and the lowest social cost . . . The central aim of agricultural policy over the long run must be to work toward that organization of productive resources that will maximize economic welfare for all the people of the nation."

The objective of this report is to set forth a methodology—an economic technique—by means of which may be analyzed the effectiveness of agricultural policies now in force and of those in prospect in bringing about the most desirable utilization of the productive resources of the nation, in so far as agriculture is concerned. The authors aim at more than this, however. They have attempted, also, rather sketchily to be sure, to shed some light on the implications of the ends, themselves, the attainment of which may be sought.

It is the authors' thesis—and this reviewer can only concur in it—that whatever be the agricultural policies pursued by government, primary attention must be given to locational problems; hence their emphasis upon the regional aspects of controls. They very rightly insist that to the extent that quotas, allotments, and

appraisals, for example, are based upon historical bases that no longer represent present and probable future conditions, the most satisfactory utilization of the nation's resources will not be achieved.

In their introduction the writers say: "In all this there is little that is new in itself . . ." In fact, however, the writers have done some very meritorious work in indicating the manner in which theoretical tools must be utilized if they are to be of use in solving practical problems. Their discussion of instantaneous and consumer-equilibrium demand may be read with profit by the general as well as the agricultural economist. Their insistence—though not in so many words—upon the fact that, however useful in the development of theoretical tools, economic data are not subject to infinitesimal variation, has long been overdue.

Despite the many merits of this report, however, this reviewer feels that it would be far more useful if certain egregious errors of theory were eliminated and the whole elaborated. In the discussion of what they call monopolistic competition, the authors are guilty of a number of errors—to be sure, errors that are not uncommon in discussions of that subject, but which a wider reading of the literature would reveal. This is especially true of their discussion of over-capacity, under-investment (of which they speak in the same breath), and volume of output. Despite their rather disarming footnote, "We are fully aware of the limitations of this approach and of the criticisms it has met . . .," the critical reader will be led to conclude that they have little conception of those limitations—and, unfortunately, the uncritical reader will be misled. Most of their strictures upon monopolistic competition really relate to oligopoly—and even then are in some cases unmerited. Their strictures upon monopoly would be much less severe, in many cases, if they related their discussion of it more closely to that of "increasing returns." The economic theorist may assume that the same proportionality and cost of factors will prevail under pure competition and monopoly—but not the policy-maker. Their use of terms, such as economic (e.g., economic and uneconomic choices) and supply is also somewhat confusing. For example, following Professor Chamberlin where he would undoubtedly no longer want to be followed, they state, "Many, if not most situations of monopolistic competition tend to approach determinate equilibria, and these do not equate demand and supply." Confusion of "supply"

and "costs" is no longer excusable in view of the tremendous amount of literature upon the subject.

Despite its shortcomings, however, the work is well worth reading.

E. S. LYNCH

Iowa State College

Cooperation at Home and Abroad, by C. R. Fay, London, P. S. King & Son, Vol. I, 1936, 447 pp. Vol. II, 1939, 540 pp., 15s. *Year Book of Agricultural Cooperation, 1939*, Edited by the Horace Plunkett Foundation, London, P. S. King & Son, 1939, 558 pp., 15s.

Students of cooperation will be much interested in Dr. Fay's two-volume revised edition of his well-known work, first published in 1908. Our interest, in this review, centers primarily in Volume II, since Volume I is simply a reprint of the earlier edition. Volume II is an entirely new work, which is concerned largely with the cooperative developments of the period from 1908 to 1938.

The main value of Volume II lies in the fact that it has been written from a broad, philosophical viewpoint by one, who for many years, has followed closely the cooperative movement in its multiple ramifications. It is divided into four parts: Part I—General, Part II—Industrial Cooperation (Great Britain and Europe), Part III—Agricultural Cooperation (English-Speaking World), and Part IV—Scandinavian Cooperation at Close Range. In addition to these four parts, there is a valuable supplement, prepared by the staff of the Horace Plunkett Foundation, on "Agricultural Cooperation in Europe." The most penetrating chapters in the book are those which relate to (1) "Evolution of the Cooperative Idea," and (2) the "Analysis of the Cooperative Form." American readers will be particularly interested in the two chapters devoted to cooperation in the United States and in the rather informal chapters on the Scandinavian cooperative movement.

* * *

The *Year Book of Agricultural Cooperation, 1939*, continues to present its annual inventory of agricultural cooperation by countries in all parts of the world. In addition to this valuable service, the present volume also contains several contributions of a more

general character, such as H. F. Norman's interpretative essay on "Sir Horace Plunkett as Cooperator," and Professor A. W. Ashby's analytical essay on "Cooperation and the State."

JOSEPH G. KNAPP

Farm Credit Administration

Agricultural Marketing in India, by B. B. Mukherjee. Calcutta: Thacker, Spink & Co., Ltd. 1937, 259 pages, Rs. 4/8.

This book is an attempt to offer a comprehensive study of the processes involved in marketing the principal agricultural products of India, and is based upon a number of years of personal observation by the author. The book is primarily descriptive, containing a large number of detailed descriptions of the various markets and the transactions involved.

The discussion is functional in approach, with very little analysis of the conditions described by the author. A chapter is devoted to the development of cooperative marketing, and one to governmental assistance to agricultural producers in India, both with comparisons of conditions in other countries. A treatment of the behavior of agricultural prices provides no contribution to that subject.

Mr. Mukherjee emphasizes the important function of the middleman in a region where growers are uneducated, unorganized, and economically weak. He finds the marketing process inefficient and costly owing to abuses which are prevalent as a result of the lack of control and organization of the markets. His suggestions for improvement in the marketing system are, therefore, directed toward the elimination of these abuses, and include the prevention of adulterations, standardization of grades, weights, and measures, provision for licensed warehouses, improvement of transportation, credit, price reporting facilities, and so forth.

The book provides much information, a large part of which is presented in a mass of fragmentary detail, relating to the processes involved in marketing agricultural products in India. The organization leaves much to be desired, and the reader loses perspective through the absence of summary statements. The discussion is supplemented with data which would not prove adequate for a careful research worker, and which in many instances are presented without adequate explanation. The author frequently neglects to

keep the reader properly oriented with respect to the terms and places discussed.

DONALD M. RUBEL

U. S. Department of Agriculture

Barriers to Internal Trade in Farm Products, by George R. Taylor, Edgar L. Burtis, and Frederick V. Waugh. Special Rept. to Secretary of Agriculture, U.S.D.A., 1939.

This special report to the Secretary of Agriculture provides a comprehensive disclosure of the multiplicity of laws and regulations created by state and local legislative or regulatory bodies which operate as barriers to trade in agricultural products between and within the states. The restrictive regulations and practices described in the report pertain to dairy products, margarine, alcoholic beverages, railroads, motor vehicles, merchant truckers, grades, standards, labels, quarantines and state financed advertising of farm products.

The investigators had as their objective a broad survey of all measures which serve to restrict the internal movement of agricultural products¹ and do not pretend to analyze in any precise manner the economic effects of the trade barriers discussed. Many admirable suggestions (not recommendations) for restoring free movement of goods are made; usually with a degree of caution or qualification in full keeping with the writers' frequent reiterations of the complexity of the problem with which they were dealing.

A considerable amount of the existing restriction is not purely and simply designed for protection, nor is an uneconomic allocation of resources the only result. Thus such restriction is not open to the categorical condemnation applied to federal protective tariffs. Sanitary regulations relative to dairy products, for example, admittedly have a proper function and although they do prevent the free movement of dairy products, no one suggests the complete scrapping of all such measures. It is suggested that when such

¹ The following definition of the term "free trade" is given by the writers: "Free trade is a situation in which (1) each State and each market in each State admits any healthful and honestly described products from any part of the country without any kind of discrimination on account of the location of the producer or dealer, and (2) the various State governments and the Federal Government co-operate in the development of laws and regulations that are as simple as possible and as uniform as possible in order that a shipment that is acceptable in one market will also be acceptable in any other market in the country."

It appears to me that the word "healthful" is not altogether relevant and defensible in the above definition; especially if the products are "honestly described."

regulation is clearly designed primarily to restrict a market or "stabilize" a local industry, rather than to supply health protection, the true purpose of the regulation should be acknowledged so that it can face the test and stand or fall on those grounds. The writers also very properly suggest that we might well consider whether or not some of our health protection is not bought at too high a price.

Excise taxes applied to margarine, it is revealed, are now applied in one form or another in over half of the States, and heavy license fees applicable to manufacturers and dealers of margarine are widespread. The investigators' reply to the familiar arguments advanced in support of restricting the manufacture and sale of margarine includes the following points: 1—denial of asserted dietary objections to the consumption of margarine, 2—demonstration of the futility and false economy of attempting to "equalize the burden of taxation" and the cost of production of margarine and butter, 3—assertion to the effect that restrictions of the sale of margarine could in any case offer only a very insignificant contribution to the solution of the economic problems of dairy farmers, 4—a warning as to the dangers of retaliation from areas producing important margarine ingredients. It is notable that the writers declare themselves unwilling to deny the validity of the principle involved in taxing the margarine industry to aid the dairy industry but rather declare the question to be open to careful consideration. A clarification of the writer's position on this matter would have been very much in point.

In exercising their legal rights to control the sale and consumption of alcoholic beverages within their borders, the States are in many cases enacting legislation which performs the additional uneconomic function of discriminating against such beverages manufactured in other States. Prospects of relief from this situation are not bright in view of recent court decisions, but some hope is held forth for improved voluntary cooperation between the States.

In regard to grading, standards and labels, railroad, motor vehicle and quarantine regulations, the most significant suggestion offered by the writers is to the effect that standardization and unification of such measures on a national scale would be a highly desirable step toward effecting a more economic distribution of products and use of resources.

This report will be of great interest to all those who are con-

cerned with the growing tendency of the States to restrict the movement of goods inward across their borders. It is valuable as the first comprehensive expression of the gravity of this movement, and further, it will constitute an excellent point of departure for students who may desire to study in greater detail the separate problems involved, with a view to obtaining quantitative measurements of the economic effects of restriction and to formulating recommendations for corrective action.

As to the general balance between description and analysis in the report, the reviewer is left with the conviction that an extension and refinement of the analytical sections would have been very much in order and would have strengthened the report materially.

CHARLES M. ELKINTON

Iowa State College

Social Problems in Agriculture: Record of the Permanent Agricultural Committee of the International Labor Office. London, P. S. King & Son, Ltd., 1938, pp. 162, \$1.00.

Since its first meeting in Washington in 1919, the International Labor Conference has interested itself in agricultural labor questions. At the 1921 session, three agricultural Draft Conventions, relating to the right of farm workers to organize, workmen's compensation, and child labor, were adopted, also seven Recommendations dealing with other such matters. Subsequently, work in this field was carried on by a Mixed Committee, made up of representatives of the International Institute of Agriculture and of the Governing Body of the I.L.O. In 1928 and 1933, studies were issued by the I.L.O. dealing with the organization of farm laborers and collective bargaining. In 1935, however, the Conference decided to set up a permanent committee, representing all classes engaged in agriculture, for the purpose of guiding the I.L.O. "with regard to the further handling of agricultural labor questions." This publication is a record of the first meeting of this body at Geneva. Dr. Lowry Nelson, of the University of Minnesota, sat as one of the 15 agricultural experts.

The report consists of an introduction, setting forth the origin of the Permanent Committee, and of three divisions; the first of these includes a series of reports prepared by the I.L.O. for the use of members of the Committee, the second is a summary of

debates at the first session and the third is the Committee's formal report.

Of chief interest in this publication are the summaries of experience in various countries as regards hours of work and holidays with pay, the protection of child labor, the forms and extent of wage regulation in agriculture and the development of agricultural labor legislation. The number of nations in which such matters are dealt with by legislation or collective agreements is impressive. The question is raised whether, in over-seas countries in which the period of agricultural expansion appears to be drawing to a close and the necessity of stabilizing agricultural production is becoming evident, social policy affecting agricultural labor will take a similar course. It is doubted whether the adoption of a policy of "promoting the efficiency of agriculture and its profitability and thereby improving its capacity to offer better working conditions" will of itself solve the social problem in agriculture (p. 97).

In the debates of the Committee the question arose whether small operators, as well as farm workers, should be included in its discussions and whether this would lead to a conflict of jurisdiction with the International Institute of Agriculture. Mr. Nelson emphasized the rapid increase of mechanization in the United States, and indicated his view that, in any consideration of its effects, small farmers, as well as wage workers, must be included. The report of the Committee left this matter for future decision. It proposed that the I.L.O. should undertake a study of mechanization, should seek the collaboration of other international agencies in a broad survey of the factors affecting the social conditions of agriculture, and should continue its special studies of the topics, indicated above, on which the I.L.O. had reported to the Committee.

WILLIAM T. HAM

Bureau of Agricultural Economics

Seven Lean Years, by T. J. Woofter, Jr., and Ellen Winston. Chapel Hill: The University of North Carolina Press. 1939. Pp. vii, 187, \$1.50.

This little book of 176 readable pages is an attempt "to give a non-technical summary of the most fundamental aspects of maladjustment in rural areas and to outline methods for the reconstruction of rural life which should prevent recurrence of needless distress." (P. vii.)

To quote the authors more fully as to purpose:

"In the literature of agricultural reconstruction based on the aftermath of the depression of the early thirties, much has been written about the farm price structure, surplus crops, erosion, and dust storms. Not so much has been written about the human elements involved. It is the authors' conviction that the human drama of struggle, defeat, disillusion, and hunger is essentially basic and that the humanitarian has a contribution to make to rural reconstruction at least equal in importance to that of the chemist, the engineer, the agronomist, or the economist. It is, therefore, the primary objective of this book to give consideration to the rural problems in terms of *human* elements as well as in terms of production, prices, and markets." (P. v.)

The chapter headings give some indication of scope and content: Changing Rural America, The Significance of Rural Distress, Insecurity in Agriculture, Man Power and Opportunity, Perplexed Youth, Unequal Opportunities, Landless and Low Income Families, Farmers on Relief, Villagers on Relief, Regions of Chronic Distress, Drought Distress, and Relief and Reconstruction.

As source material the authors draw heavily on many of the elaborate statistical sources not available to the average reader either because they are not found in most libraries or because they are too detailed and dry for most readers. Aside from numerous bulletins and articles of a popular sort, these sources include such documents as the research monographs of the Works Progress Administration, the various reports of the National Resources Board, the Carter Goodrich report, and, of course, the United States Census reports.

Although some readers will feel that the book gives too much emphasis to the darker aspects of the picture, it should serve to point out that "the agricultural problem" is extremely complex, and that crop control programs are by no means the one "answer," if indeed the right one.

H. E. ERDMAN

University of California

NEWS ITEMS

R. H. Allen, formerly of Harvard University, has recently been appointed to the staff in Farm Economics at the University of Kentucky.

Howard W. Beers, formerly of Rutgers College, New Jersey, has joined the staff of the Department of Farm Economics, University of Kentucky.

The 12th annual meeting of the Western Farm Economics Association was held during the three-day period of June 14-16 at Berkeley, California; with the Division of Agricultural Economics, University of California, acting as host.

A new member of the Farm Economics staff in Kentucky is Lawrence A. Bradford, appointed to succeed Z. L. Galloway who resigned to accept an appointment as Extension Economist in the Federal Bureau of Agricultural Economics. Professor Bradford was formerly affiliated with the Farm Security Administration.

James H. Clarke has resigned his position in the Department of Markets and Rural Finance at the University of Kentucky to become extension economist at the University of West Virginia.

T. K. Cowden was promoted to Associate Professor at Purdue University, effective July 1.

S. H. DeVault, Head of the Department of Agricultural Economics and Farm Management of the University of Maryland, was recently appointed by the Secretary of Commerce as chairman of a Special Advisory Committee on the 1940 Census of Agriculture. The work of this Committee consists in the preparation of the farm and ranch schedule, the multiple-tenant schedule, instructions for enumerators and recommendations with respect to the tabulation and presentation of results.

C. M. Hardin, Purdue University, will study economics under a Farm Foundation fellowship at the University of Chicago during the school year 1939-40.

E. P. Heiby, who has been on leave of absence for the past year pursuing graduate work at the University of Chicago, returned to the Department of Rural Economics, Ohio State University, on July 1.

P. A. Henderson, has accepted a position as Extension Specialist in Farm Organization at Purdue University effective September 1.

Roy Huffman, of the Department of Agricultural Economics

and Farm Management in the University of Maryland, has recently accepted a position as Assistant Land Use Planning Specialist in Maryland.

J. Russell Ives has resigned his position in Agricultural Economics in the Department of Agricultural Economics and Farm Management in the University of Maryland to accept a position in the Division of Statistical and Historical Research in the Bureau of Agricultural Economics, U. S. Department of Agriculture.

A. R. Mangus, formerly with the Division of Social Research of the Works Progress Administration, has been appointed Professor of Rural Sociology in the Department of Rural Economics, Ohio State University. Dr. Mangus assumed his new duties on April 1.

E. H. Matzen has accepted a position as Extension Specialist in Marketing at Purdue University, effective September 1.

A. Mauch accepted a position with the Bureau of Agricultural Economics, Division of State and Local Planning, as Assistant Representative, effective July 1. He will be stationed at Lafayette, Indiana.

Merton Oyler, of the staff of Rural Sociology, University of Kentucky, goes on a year's leave of absence for study to the University of Chicago.

B. D. Raskopf, Assistant Agricultural Economist, University of Tennessee, will leave for Memphis on July 1 to assume his duties as joint representative of the University and the Division of Cotton Marketing, U. S. Department of Agriculture.

J. Wayne Reitz has been granted a year's leave of absence from the University of Florida beginning September 1, 1939, to continue graduate study at the University of Wisconsin. He has been granted a graduate fellowship by the General Education Board.

John B. Roberts has been granted a year's leave-of-absence from his present position at the University of Kentucky for graduate study at Harvard University.

Vance M. Rucker has resigned his position as Extension Economist at Kansas State College to become Secretary of the Bank for Cooperatives at Wichita, Kansas.

Glenn R. Smith will return from Cornell University to duty at North Carolina Agricultural Experiment Station July 1, 1939.

M. G. Smith will join the teaching staff of the Farm Management Department, at Purdue University, September 1.

G. P. Summers has been appointed field agent in marketing for

the Kentucky Agricultural Extension Service. He will develop work in the field of tobacco marketing.

James Tinley, of the Department of Agricultural Economics, University of California, Berkeley, is on sabbatical leave during 1939-40. Dr. Tinley will travel extensively but utilize most of the year in South Africa where he will study the effects of agricultural policy on the standard of living with special reference to the native population. His program of study has been made possible largely by a grant from the Carnegie Corporation.

Bennett S. White, Jr., has resigned his position in the Bureau of Agricultural Economics to accept an assistant professorship at the University of Kentucky. Dr. White will teach and conduct research in agricultural marketing and cooperation.

Ramey C. Whitney, Department of Economics Sociology and History at the State College of Agriculture, Fort Collins, Colorado, has been awarded a non-service fellowship at the University of Minnesota and has been granted a leave of absence for the college year 1939-40.

Lawrence Witt, Department of Agricultural Economics, Iowa State College has accepted a Farm Foundation fellowship for study at the University of Chicago.

IRVING G. DAVIS

1885-1939

Irving G. Davis died on March 15, 1939 at his home in Storrs, Connecticut. Less than three months before his death he was elected President of the American Farm Economic Association. His last weeks were devoted mainly to preparing the program for the coming annual meeting of the Association.

Dr. Davis was widely known for his work in farm organization and land use, but his influence went far beyond these special fields. He was interested in a wide variety of problems in agricultural economics, social welfare, government and statistics. Workers in many of these fields will miss the friendly, practical advice of "I. G.," which was the unassuming title by which he was usually known.

His wide interests and his friendliness made him an invaluable member of numerous committees. In his native New England he was one of the leaders in organizing the New England Research Council on Marketing and Food Supply and the New England Institute of Cooperation, and he always was willing to spend whatever time and thought was necessary to help develop such organizations along constructive lines. Yet his work was not limited to New England. He worked hard and well for the Social Science Research Council as Chairman of the Advisory Committee on Agriculture, and worked actively with many other national groups.

"I. G." was the kind of man who could not settle down into any kind of rut. Although he graduated from Bates College in 1906 he did not get an opportunity to finish his graduate work until 1937, when he received his doctor's degree at Harvard. It was no easy task to leave his work as head of the Economics Department at Connecticut State College to go back to school for extended periods, but he did it, and he worked at his studies with all the zest and thoroughness which characterized all of his activities.

Several of Dr. Davis' studies have been published by the Connecticut Agricultural Experiment Station. Those dealing with soil type and with type of farming were major contributions to agricultural economics. Not only did these studies help bring about important changes in Connecticut agriculture, but they developed

a technique of analysis and a point of view which will be useful for many years in all parts of the country.

But most of us who knew "I. G." will remember him not so much for his professional accomplishments as for his genuine friendliness, his sympathetic understanding of problems outside his own specialty, and his ability and willingness to brush aside details and get to the root of essentials. His office at Storrs was a rendezvous for economists looking for ideas and suggestions. It was not always an orderly office, because "I. G." usually had plenty of work piled up, but it was comfortable and he always found time to talk with anyone who had a real problem. His home, on a little farm at Springhill, a few miles from the college, was likewise always open to those of us who needed help, and Mrs. Davis and the three children always appeared just as glad as "I. G." to welcome old friends who stopped in unexpectedly.

Dr. Davis was always modest and unassuming, and seemed surprised when honors began to come his way. They were richly deserved honors. The death of our friend is a serious loss to a great number of people throughout the country.

F.V.W.

ARTHUR W. MEDLAR

1876-1939

Arthur Walton Medlar, Associate Professor of Rural Economics at the University of Nebraska, passed away unexpectedly at his home February 4. His death was due to angina pectoris.

Professor Medlar was connected with the University continuously from September 1918 until the time of his death. He taught courses in farm organization and farm accounting and for more than twenty years he came in contact with nearly every student who graduated from the College of Agriculture. He was one of the faculty to whom students wrote after they left college and whom they visited whenever opportunity offered. They referred to him questions upon farm management, income tax reports, farm leases, farm costs and other matters concerning farm operations.

Professor Medlar was too busy teaching and answering letters to permit him to give much time to research. He aided other men in planning projects and preparing reports, but his name appears

as author of only one Nebraska bulletin, No. 319, Equipment Expense Per Acre on Farms in Nebraska. He prepared various circulars and was joint author of a farm arithmetic. He left a partly completed study of Nebraska farm incomes.

Professor Medlar spent his boyhood on a farm in Fillmore County. He graduated from the Ohio high school, taught rural school, and attended Doane College from which he graduated in 1906. He spent the next seven years at Gates Academy serving as, principal the last three years. He was a graduate student at the University of Nebraska in the years 1913-15, operated the "home farm" until 1918, and then returned to the University with an unusual background of science, economics, and practical experience. He is survived by his wife and by two daughters, Margaret (Mrs. Burton Marvin) of Chicago, and Faith, a junior at the University of Nebraska.

H.C.F.
